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Official Organ of the

Massachusetts Association of Boards of Health
and The American Public Health Association

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EDITORIALS

THE JOURNAL OF THE AMERICAN PUBLIC HEALTH ASSOCIATION: AN ANNOUNCEMENT.

With this issue, November, 1910, the AMERICAN JOURNAL OF PUBLIC HYGIENE *appears for the last time as a quarterly. Beginning January, 1911, it will take an assured place as a monthly, representing professional public hygiene, as it always has done, but under the title and with the added dignity and prestige of the* JOURNAL OF THE AMERICAN PUBLIC HEALTH ASSOCIATION. *It thus becomes an International Journal representing the profession of public hygiene in Canada, Cuba, Mexico, and the United States.*

A full account of the aims and methods of the new Journal which are identical with those of the present Journal, will appear in its first issue. A brief resume of the history of the present Journal seems appropriate for the present issue.

In the issue of the Journal of the Massachusetts Association of Boards of Health of November, 1903, appears the following statement:

"THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH *was organized in Boston, March, 1890, with the following objects: The advancement of sanitary science, the promotion of better organization and co-operation amongst local Boards of Health, and the uniform enforcement of sanitary laws and regulations.*

"*The Journal of this Association has for thirteen years faithfully reflected the views of the public hygienists of Massachusetts. As the only one of its kind in Massachusetts, the Journal has had its own field, which, however, it has not yet fully occupied. With the October issue of this year, 1903, a policy of expansion was adopted. The subscription list showed an immediate and most gratifying increase, so that this, the second issue, has a total circulation of three hundred per cent. over that of the July issue.*

"*The Journal will contain the papers read at the meetings of the Association, verbatim reports of the discussions, editorials, abstracts, reviews, and hygienic notes of professional interest.*"

A year later further expansion to a national standard was undertaken, and subsequent issues contained the following statement:

"*With the November issue of the year 1904, the encouragement received from many hygienic quarters induced the Massachusetts Association to undertake the expansion of the Journal to a national standard, with the co-operation of many sanitarians as editors. A new title, (American Journal of Public Hygiene), was selected, while the older and well-established title, (Journal of the Massachusetts Association of Boards of Health), was retained also.*"

In November, 1907, the American Journal of Public Hygiene became the official organ of the Laboratory Section of the American Journal of Public Hygiene in addition to continuing its close and cordial official relationships as the organ of the Massachusetts Association of Boards of Health. In this issue the following statement was made by its managing editor.

"*With the assumption of its new duties it has dropped its sub-title, becoming now the American Journal of Public Hygiene, a title expressive of the exact field it aims to cover.*

"*By the new arrangement, all members of the American Public Health Association receive this Journal, while the present subscribers and members of the local association profit by the added valuable material with no increase in price.*

"*We trust this is but one step toward the consummation of what seems to the editorial staff most desirable—a closer relationship between the various local public health organizations and the national association.*"

In February, 1909, the American Journal of Public Hygiene became the official organ of the whole American Public Health Association. In this issue the following statements were made:

"Five years ago, foreseeing the need for a national publication devoted exclusively to the public hygienist and sanitarian, this Journal (American Journal of Public Hygiene) was launched. As previous to that date the Journal had been but the mouthpiece of a state public health organization it was some little time before the country at large could look upon it except in that light. As with most other ventures of the kind, the fight has been an uphill one against heavy odds, and the time and energy of the editors have been put into the work without thought of reward except that which may have come from the results obtained. Credit is largely due to the present Associate Editor for his foresight in perceiving the field which the Journal might sometime fill, and to the Massachusetts Association of Boards of Health for its loyal backing."

That due credit may be given to those concerned it should be stated that the publication of the original Journal of the Massachusetts Association was under the supervision of Dr. Samuel H. Durgin, who continued as chief editor under the various reorganizations to the present time. From 1903 to 1906, Dr. H. W. Hill acted as managing editor, then becoming associate editor. From 1906 to the present time, Mr. B. R. Rickards has been managing editor. He becomes by election of the Journal Committee of the American Public Health Association, managing editor of the forthcoming Journal of that Association.

CORRELATION OF PUBLIC HEALTH MOVEMENTS THE CALIFORNIA PLAN.*

There are now sixty-nine National Associations organized to deal with the various phases of improvement in the social and health conditions of the public. Fourteen of these are concerned solely with promoting the public health. Many of the others have important sections on health conservation. The people of the United States are the source of membership and revenue for these associations, and the ultimate recipients of their activities. An analysis of their annual reports and investigation of their operations in every section of the country will convince any observer that there is need for correlation and even elimination of much of the work now being done.

The California plan provides for a business alliance among the several State associations engaged directly or indirectly in public health conservation. The terms of this alliance are not intended in any way to interfere with the individuality or policies of the component associations. The constitution is extremely simple, the essential features being a board of forty directors and an executive committee of nine. The function of this board of directors is purely advisory. The work of the executive committee is carried on through three standing committees. All reports and recommendations of the executive committee go to the advisory board for approval before presentation to the component associations for consideration and recommended adoption.

The three standing committees are as follows: Committee on Educational Policies; Committee on Administrative and Financial Methods; Committee on Legislation. The Chairmen of these respective committees are members of the executive committee—two other members of each of these committees are members of the advisory board living within frequent meeting distance of the chairman. Added to this working nucleus are twelve members of each committee chosen from the combined membership of the

component associations according to the geographical distribution of the State's population.

THE COMMITTEE ON EDUCATIONAL POLICIES has two general functions: (1) to make comparative studies of the educational work of all the component associations and their divisions; (2) to direct the common interests of program and arrangement for the several associations. The first function will be discussed later in conjunction with the duties of the general secretary.

The second function may be outlined briefly as follows: Local Committees on arrangements and program are appointed for population districts of 30-50 miles radius. These local committees are divided into two divisions: (a) program and schedule details, (b) lecture hall and demonstration facilities. The members of the first division prepare calendar schedules of all lectures and public events of every sort that are announced, and suggest open dates for public health lectures. They prepare travel schedules for each proposed lecturer, and outline the order in which public opinion will probably favor the presentation of health topics. The members of the second division tabulate the available lecture halls, etc. in their district, the respective seating capacities, lighting, heating and ventilation facilities; the costs of rental for various meetings; the open dates; facilities for open air lectures and other data of importance. They arrange for meals and lodging for speakers who have to remain over night. They provide for the details of demonstrations or lantern slide exhibits. In short these local committees are composed largely of representatives from the various local public health, medical, commercial, charitable and church organizations, and serve as clearing house agencies for all matters common to all the associations. These committees do not attempt to take the place of local societies of the component associations. Upon the latter devolves the responsibility for advertising their own lectures, for providing traveling expenses of lecturers, for distributing their own literature and for advancing their special interests generally.

These local league committees carry on their work under the direction of the central standing committee. The latter in co-operation with the officers of the component associations maintains a lecture board, which is organized and operated as

follows: In each population district from four to six local lecturers of known ability are selected upon their promise to give three or four lectures annually for the League, the subject, date and place for each lecture to be assigned as required. The Committee then arranges with each component association for a series of skeleton outlines of lectures—three or four in number—which will give an accurate idea of the purposes, the work being done and the needs of each association. These outlines are accompanied by full data on the history, statistics, etc. of each association. Such of these lectures as it is desirable to illustrate with charts, exhibits and lantern slides are referred to the State Board of Health for the preparation of material.

The committee then arranges in conference with all the component associations a general plan of campaign and adjusts the tentative tours of special lecturers, so that two or more special "crusades" will not be operating in the same territory at once. The schedules for the local lecturers are also planned at this time. Thus it will be seen that no great burden of work falls upon any individual identified with this administrative mechanism, nor is the freedom of any participating organization unduly limited thereby.

THE STANDING COMMITTEE ON ADMINISTRATIVE AND FINANCIAL POLICIES likewise has two functions: (1) to make a comparative study of the administrative details and the methods of financing the component associations; (2) to serve as a bureau of information on the lowest costs of stationery, signs, printing and other supplies; to furnish estimates on construction and maintenance of sanatoria, clinics, day camps, playgrounds, etc.; and in so far as may be requested to serve as treasurer and collector for the component associations.

THE COMMITTEE ON LEGISLATION has two functions: (1) the collection of legislative measures proposed for presentation to the State Legislature, County Supervisors, or City Boards of Trustees; the study of these measures in the light of similar previous enactments in California or elsewhere, and the suggestion of such modification or amplification as experience has suggested: (2) the aiding of local societies in procuring the enforcement of public health laws, and the overcoming of unwarranted prejudice against the enactment of desirable ordinances.

Mention has been made of the Executive Committee and the Board of Directors. The Executive Committee members are so distributed that with the presence of the general secretary a quorum may be called in any one of three sections of the State—i. e. Sacramento, (the State Capital and a central point for the interior valleys); San Francisco, (central for the coast counties and the bay cities); Los Angeles (central for the southern section of the State. To this committee many matters for adjustment or advice are referred from the standing committees and from local societies of the component associations.

But the Executive Committee has other important functions: The General policies of the League, its relations to other state associations not identified with public health work, the consideration of reports of the standing committees prior to presentation to the board of directors. All these things require time and thought from the Committee. Another function is the arranging for an annual meeting of the League. This is held the day before the meeting of the state medical society. The program consists of a joint meeting of all the delegates in the morning for the presentation of administrative subjects of common interest, afternoon section meetings of closely related component associations, a business meeting at 5 p. m. for election of officers, board of directors and executive committee, and an informal dinner at 7 p. m., during which brief talks are made concerning the work for the coming year.

Necessarily the secretary of the League is responsible for keeping the work progressing steadily and smoothly in all parts of the state, but his most important duty consists in collecting data for the comparative studies being carried on by each of the standing committees. It is through the findings of these investigations that the League hopes to standardize the methods of the component associations, to aid in the extension of their influence to every part of the State, and to build up a broad conception of the health conservation movement.

The president and vice-presidents of the League are of statewide reputation for their business ability and active participation in philanthropic work. It will be evident that the endorsement of a Society or of its financial agents by the League is valuable.

To the president, vice-presidents and secretary of the League, as a committee, are entrusted the investigations upon which all such endorsements are based.

The policy of the California State Board of Health has been to aid all volunteer public health movements in every way possible rather than to take the lead itself. The State Board believes the League has entered a most valuable field of usefulness, and consequently extends its full co-operation and influence in this pioneer work. A special division of the monthly State Bulletin is devoted to "Progress of the California Public Health League," and also carries the following explanatory page for the information of the general public:

PARTIAL LIST OF PUBLIC HEALTH ORGANIZATIONS OF CALIFORNIA.

(A). CALIFORNIA PUBLIC HEALTH LEAGUE.

President, Mr. A. Bonnheim, Sacramento.
Secretary, Dr. William F. Snow, Sacramento.

NOTE.—The League is made up of the Associations indicated by a (*) in the list given below. The purpose of the League is to serve as a clearing house for all the common interests of the societies composing its membership. All correspondence should be addressed to the Secretary, Sacramento, California.

(B). ORGANIZATIONS WHICH ARE ACTIVE ALONG SPECIAL LINES OF HEALTH CONSERVATION.

I. Associations for the Prevention of Tuberculosis.

1. *California State Association for the Study and Prevention of Tuberculosis. President, Dr. F. C. E. Mattison, Pasadena; Secretary, Dr. George H. Kress, Bradbury Block, Los Angeles.

2. Affiliated Branch Societies: Alameda County, Long Beach, Los Angeles, Monrovia, Pasadena, Redlands, Sacramento, San Diego, San Francisco, Santa Ana, Santa Barbara, Sierra Madre, Stockton.

II. Associations for the Prevention of Syphilis and Gonococcus Infections.

1. *California State Association for the Study and Prevention of Syphilis and Gonococcus Infection. President, Dr. John C. Spencer, Butler Building, San Francisco; Secretary, Dr. R. A. Archibald, Department of Health, Oakland.

III. Associations for the Improvement of Milk Supplies.

1. *California State Association of Medical Milk Commissions. Dr. Lewis Sayre Mace, Chairman Executive Committee.

2. Affiliated branch commissions: San Francisco, Los Angeles, Oakland, San Jose, Sacramento, Santa Barbara.

3. San Francisco Milk Improvement Association.

IV. Associations for the Improvement of Child Hygiene.

1. *California Playground Association. President, O. K. Cushing, First National Bank Building, San Francisco; Secretary, C. E. Hudspeth, 781 Fifty-ninth Street, Oakland.

2. Local associations: Los Angeles, Oakland, Sacramento, Fresno, San Jose.

V. Miscellaneous Associations Carrying on Important Public Health Work.

1. *American Red Cross. There are chapters in San Francisco, Berkeley, Los Angeles, Stockton, Sacramento and Napa.
2. *California Federation of Women's Clubs.
3. *California Teachers' Association.
4. *California Press Association.
5. *State Charities Aid Association.
6. Anti-Mosquito Associations.
7. Association of Collegiate Alumnæ.
8. Civic Department, California Club, San Francisco.

This list is incomplete and will be changed each month as corrections and additions are sent in.

Names of officers and information concerning these associations will be sent on application to the State Associations listed, or to the Secretary of the State Board of Health.

The League is yet in its infancy, but already has shown evidence of good results. This brief outline is given in the hope that other States may be stimulated to institute modifications of the California plan which will in time lead to the general adoption of a uniform plan which may be made the unit-basis for a national fusion of the many unco-ordinated elements of the great health conservation movement.

WM. F. SNOW.

Secretary, California Public Health League.

THE REAL REASON FOR STATE AND MUNICIPAL MEAT INSPECTION.

The subject of state and municipal meat inspection has received much consideration in America in the last few years, but little has been done to improve conditions. It would seem as though action should be taken by sanitary authorities to remedy these difficulties, when we take into consideration that only about half of the meat that is eaten in this country is killed under adequate inspection. The United States Bureau of Animal Industry, Department of Agriculture, has in the last few years, remedied many of the defects that exist in government inspection. Meat that is stamped "U. S. Inspected" can be considered as wholesome and fit for food.

The conditions that surround the small slaughter houses, such as are found in the cities and small country towns, are almost appalling. In many instances they are far worse than those surrounding the most unsanitary dairy barns from which health officials would not allow milk to be sold. In the State of Indiana recently a sanitary inspection of 327 slaughter houses showed that only 7% fulfilled sanitary requirements. The buildings where animals are killed are usually located outside the corporation limits, frequently on banks of streams, and the drainage is usually toward the creek. Old dairy cows are frequently killed in such houses and from the prevalence of tuberculosis in these animals, it will be seen that the disease is transmitted to swine and other small animals that are usually kept around slaughter houses, as in most cases the offal is thrown out to be eaten by rats and hogs or washed away by the water, which may be used for watering stock lower down stream. Hog cholera and parasitic diseases are frequently transmitted by these sanitary methods of disposing of offal.

While it has been shown by authorities on meat inspection that there is some danger from eating meat from animals affected with infectious and parasitic diseases, this is not the only point that should be considered, because meat is generally cooked before eaten. The large packing-house establishments where Federal inspection is maintained, have in the last few years, refused to accept hogs from certain of the old hog-raising districts unless

sold subject to inspection, owing to the fact that tuberculosis is so prevalent that the loss that they have to withstand prevents them from making any profit on these animals. The question now arises, what becomes of the hogs that are refused by the large packers, providing the farmers will not submit to sell them subject to inspection? They many times will not do this as in this case they have to stand the loss that is caused by tuberculosis in their animals. Consequently they sell them to the smaller establishments that are without inspection and the people eat the tuberculous meat. Federal meat inspection has shown that the number of tuberculous hogs has raised from 1% to over 4% in the last ten years. What is the cause of this? It is due in most cases to the feeding of skim-milk that is returned from creameries and to the fact that farmers allow the pigs to follow the cows and pick food out of the feces. This increase is very alarming and something should be done to prevent it. If state and municipal meat inspection were practiced in this country and all of the food-producing animals that were sold would in some way be marked, so that they could be traced to the owner; perhaps as Rogers* suggested, to tag each animal with a metal tag showing a number and records of the numbers of the tags kept so that the seller could be located, all animals killed for food could be inspected in an efficient way and much could be done to locate and eradicate tuberculosis and other infectious diseases that affect food producing animals. Tagging would, however, be futile, until state and municipal inspection is maintained, as farmers would be suspicious and sell their animals to establishments where they would not be inspected, not realizing that it was for their own interests to check the spread of these diseases.

One objection that is raised by many municipalities and states is that meat inspection is too expensive for what is gotten out of it, but we should take into consideration the amount of money that some states are paying to eradicate tuberculosis by reimbursing the owners of tuberculosis animals which the state has destroyed and that little is being accomplished in this way in locating infected herds. If only a small portion of this money were utilized for maintaining and requiring all animals sold for slaughter to be tagged, we could soon locate most of the infected herds, as sooner or later some of almost every farmer's hogs or

* Report of Sixth International Congress on Tuberculosis, Sec. VII, pp. 837.

cows find their way to abattoirs under municipal, state or federal authorities, and if one of these animals were found to be infected we would have evidence that tuberculosis existed on the owner's farm, and adequate police regulations could be enforced. In Europe over 600 municipal abattoirs are in operation. Modern machinery is used which saves much of the offal that is now thrown away in the smaller institutions. Recently Dr. Farrington* Assistant Chief of the Bureau of Animal Industry, United States Department of Agriculture, published an article in which he stated that fat cattle dress only about 60% of the live weight, and if modern machinery were installed and up-to-date methods adopted, packing house statistics show that the value of the hide and offal would increase the valuation of a fat steer from 60% to 75%. In other words, the 40% offal would be equivalent to about 15% of meat. It would, however, be advisable for all states to enforce tagging of animals as otherwise farmers would ship their animals to states where they would be killed without inspection.

One obstacle that city health officers have had to contend with in trying to establish municipal meat inspection is that dealers usually want to kill animals either very early in the morning or late at night, so that they can use the butchers for other purposes during the day. The slaughterhouses are frequently located far apart and in inaccessible parts of the city. If efficient inspection were established, it would require a corps of inspectors to do this work. Hence, the only solution of the problem lies in building a municipal abattoir, centrally located. (The present sanitary system obviates odors so that it could be situated in a business district.)

The question has frequently been raised, who should supervise meat inspection, the health officers or veterinary officials? It would seem as though, if the work were not in charge of veterinary officials, it should at least be a co-operation between the medical health officers and the veterinarians, as from an economic standpoint the veterinarians are more interested than health officers. But from the standpoint of the communication of diseases from animal to man, the health officers are more interested. At least, the two professions should work together in obtaining uniform laws for controlling disease, particularly tuberculosis.

*Report of the Bureau of Animal Industry, 1908, pp. 183-96.

W. L. BEEBE.

Minnesota Live Stock Sanitary Board.

SOME RECENT PROGRESS IN SEWAGE DISPOSAL.

During the last decade the progress in sewage purification has been so marked that many works, in order to be up-to-date, will require remodeling, and textbooks rewriting and enlarging. The most important part of purification works which has quite recently been improved is the sludge disposal, which has been a bothersome subject in many places for over thirty years. It was thought about 15 years ago that the introduction of the septic tank would solve the existing difficulties, and it was heralded to completely and satisfactorily dispose of the sludge question. For several years the new method spread because it was cheap, was a change from the older objectionable methods and was at least a pretense of doing something new to correct one of the most troublesome evils met with when sewage had to be purified on land.

The septic tank wave passed from England, where it originated, to our country, and here gradually from the East to our Far West. But two years ago, in California, I was met with the remark: "Of course you will recommend us to build a septic tank." Last summer two of the most prominent English sewerage engineers said to me that if their respective cities had not erected large septic tanks, they would not now for a moment think of using them.

The reasons for this change of opinion can be summed up as follows:

1. The great reduction in the amount of sludge to be handled as promised by the advocates of the septic tanks has not been realized. The failure was partly due to the fact that where the combined system of sewerage was used, large quantities of mineral and of resistant organic matter, washed from the streets by the rain, naturally found their way into the tank. Of course no septic action could reduce such matter, and this part of the sludge could not be diminished. It was also due to the fact that in some cases the anaerobic action decreased near the bottom of the mass collected in the tank by the development of toxines, which made the liquefaction very slow. At Birmingham, England the reduction of the sludge by septic action amounted to only about 12 per cent.

2. It was gradually realized that the reduction of the mass of sludge to be handled was largely a question of water content. As an example: If we have sludge in a septic tank containing 95 per cent. of water and then place that same sludge upon a field where its water content would be reduced by drainage to 50 per cent., then ten tons of sludge in the former condition would be but one ton in the latter condition, or a reduction in quantity to be handled of 90 per cent. By reducing the water content merely from 95 per cent. to 90 per cent., we reduce the bulk of the sludge 50 per cent., or one-half. Therefore, a reduction of bulk by drainage is very much greater than a reduction by septic action, the latter referring only to solid matter.

3. The odor about a septic tank is frequently offensive, although sometimes it is confined to a small area and soon lost at a distance. The odor is quite objectionable in most cases. Covering the tanks is, as ordinarily proposed, an expensive proceeding and is not necessary for septic action.

4. It was found that the septic effluent was less fit for subsequent oxidation of the sewage by biological filters (Germany) or bacteria beds (England) than fresh settled sewage, and its discharge into running streams was not as satisfactory on account of the aquatic life contained therein.

5. The sludge which has to be removed from septic tanks is often foul when taken out and its removal is connected with more or less of a nuisance.

6. There has recently been introduced another method of sludge treatment which obviates all of the above objections to the septic tank. It is known as the Emscher tank, because it originated and has been extensively used in the Emscher Valley of Germany, containing many large manufacturing cities, such as Essen, etc. This tank bids fair to supersede the older septic tank. It was suggested and developed by Dr. Imhoff.

The Emscher tank consists of a double-deck basin, through the upper compartment of which the fresh sewage flows at a velocity sufficiently slow to allow of a deposition of nearly all of the suspended matter that will putrefy; therefore, within a few hours and before septic action becomes established. The particles of matter slide down the inclined bottom to a slot through which they enter the lower tank and where they remain. The sewage

therefore leaves the upper tank free from all coarse suspended matter, and in most cases is sufficiently fresh to need no further treatment if discharged into a natural course of sufficient flow. In the lower tank the sludge accumulates and remains submerged for several months, during which time it digests or rots, so that after a certain time the putrescent matter has disappeared. The sludge has then changed from an odorous, sticky and slimy condition to a non-odorous, earthy and friable condition.

The gas which evolves in the lower tank escapes at the surface at designated points. The action of decomposition is shown at the surface by more or less active ebullition, and is an index of the rate of decomposition. The gas is chiefly carbureted hydrogen, or marsh gas and has no odor. In rising to the surface the bubbles bring with them particles of sludge which form a scum, but the area at these points of escape is very small, amounting to but a few square feet. The rising bubbles bring no suspended matter into the upper tank and thus none is mixed again with the fresh sewage passing through it, as the position of the slot prevents an entrance.

The withdrawal of the sludge from the bottom of the lower tank, which also has an inclined floor, is accomplished through the water pressure in the upper tank, forcing the sludge to within a few feet of the water level in a pipe from which it can be discharged when desired. This discharge should be brought about at frequent intervals once or twice a week, but only as much should be withdrawn at one time as is completely rotted out. This frequent motion, caused by the withdrawals, displaces the sludge mass while it slips downward to the outlet to fill the space from which some of it has been withdrawn. By this displacement each time the toxines are scattered and new surfaces are brought together which assist in maintaining a continuous bacterial action. A further slipping of the mass is accomplished by the discharge of water from pipes, laid upon the bottom of the tank, whenever it is found necessary.

The sludge when withdrawn is conducted to a bed suitably prepared by underdrainage and spreads out upon the same in a layer. Its water content when issuing is from 80 to 90 per cent. Due to the disappearance of much organic matter the amount of water held is less, other things equal, than in fresh sludge. After

three or four days of dry weather the Emscher sludge has lost so much of its water that it can be spaded and is then thrown upon trucks which remove it to a final dump. The liquid draining from this sludge in the beds is generally perfectly clear, has no odor and can be discharged into any water course.

There are now several dozen of these tanks in operation in Germany and at no place examined by the writer was the sludge found to be offensive or could not be used for making land. Nowhere was an odor of sulphureted hydrogen apparent, although such odor might be produced were the sewage not fresh on delivery or under some other conditions not yet definitely known.

It has been feared, unless fresh sewage were continually brought and mixed with the settled sludge, that the putrefaction or rotting out would diminish and finally cease. The practical results have so far not justified such fears in the cases visited, where an effort was made to give occasional motion to the sewage within the lower tank.

An experiment with this method has recently been made in the city of Philadelphia lasting for about one year, with the same favorable results that were reached in Germany.

There is still an unsettled question which awaits an answer, regarding the very best means of accelerating the bacterial action in the lower compartment of the Emscher tank. Experiments are now being made in this direction. It has seemed that it might be an advantage to cultivate a particular class of bacteria, namely, that class which produces carbureted hydrogen, than to allow of a great variety of classes to be present and active, as they generally are in ordinary sewage. The class which produces sulphureted hydrogen should, if possible, be prevented from developing, and in practice this seems to have been accomplished at a number of plants. The best conditions permanently to secure an inoffensive sludge digestion will, it is therefore hoped, be ascertained at no distant date.

In a few European cities, particularly in Frankfort o. M. a method of sludge drying has recently been developed by the use of centrifuges. In these cases the sludge is fresh and therefore still contains all of its putrefying matter. The drying of fresh sludge is more difficult than that of the digested sludge of the

Emscher tanks. As a matter of fact, it is not as dry, when it leaves the centrifuge, as the Emscher sludge after a few days draining, and there is a further difference in that the former retains its strong foul odor and the latter has none. It must not be overlooked that the cost is also a factor to be considered, but reliable comparative results have not yet been published. It cannot be questioned, however, that a sludge turned out upon the ground which is not foul, is worth a greater expenditure than one that is foul.

From what has been said above it seems that the most troublesome feature of sewage purification on land and perhaps also in our rivers, has at last been found capable of some correction at a reasonable cost, and had been developed to a point where a nuisance can be avoided.

In most cases it should not be difficult to build our sewers with regular and smooth interior surfaces, so that the flow is complete, without forming pools, eddies or other irregularities which invite deposits and subsequent putrefaction. It should not be difficult to allow large quantities of air to circulate in the sewers and to furnish the oxygen necessary to facilitate ample oxidation. Then the sewage could reach the disposal ground without offensive odor unless the distance is very great. It will also be possible to deposit its suspended matter in a suitable tank and pass on, still in a fresh condition, either into a water course or be discharged upon coarse-grained filters for final oxidation.

It will not be possible to reach this desirable end in every city, but it will be possible to reach it in most cities, and when the advantage is fully recognized of maintaining sewage in a fresh condition, from the point of its generation to the point of its disposal, no doubt many improvements can be made towards securing this end in many of our cities. It would certainly mark an important step of progress in this branch of engineering.

The oxidation of sewage by coarse-grained or biological filters has recently been making great progress, both in Europe and America. It has been found that sewage must be freed as much as practicable from suspended matter if the biological filters are to do their work most economically.

Prior to turning the sewage upon these filters it is now often the endeavor to give it a very thorough preparation. Settling

tanks or septic tanks were not found to completely avoid the passage of some fine suspended matter to the sprinkling filters, and it has been tried to improve the condition by introducing, between such tanks and the filters, some fine screening or scrubbing, or of allowing a passage through a small roughing filter by which the finer particles of suspended matter are retained and do not reach the filter. These provisions mean, of course, additional labor and structures, but it appears that the expense is often reimbursed by greater efficiency. At Birmingham, England, the introduction of roughing filters has reduced the stoppages in the sprinkling nozzles to such an extent that one man is now doing the work on the beds that formerly required four men.

The opinion is growing that bacterial action is not the chief agent in the purification of sewage. Larger organisms are credited with doing a large amount of the work. But the mechanical theory of purification which claims the purification to be almost entirely due to physical as against vital forces is also making some progress. It has for its chief advocates Dr. Travis in England and Stadtbaurat Bredtschneider in Berlin.

The truth seems to lie in the direction of giving credit to all three causes. It remains merely to point out the proportion of the whole purification which each one effects, which has not yet been satisfactorily done.

It must further not be overlooked that a good deal of the solid matter issuing from filters is organic matter that has been formed and grown within them, representing organisms which have performed their work and have died. All organic bodies, including ourselves, are formed of material that was first in solution and has been transformed into solids by organic processes. This may explain the fact that from some filters more suspended matter has issued than has been discharged upon them. The theory of de-solution advocated by Dr. Travis finds its verification, it would seem, partly by the formation and growth of organisms within the filters.

Regarding the presence of bacteria in sewage, from the moment of its origin to that of its final disposition, the opinions are crystallizing around the conviction that we must discriminate between two kinds of bacteria: Those which are pathogenic and apt to

produce diseases in higher organisms, and those which are essential in effecting sewage purification by mineralizing the organic matter.

While on the one hand, therefore, we must do everything in our power to destroy the former, on the other we must be equally solicitous to foster the development of the latter, until their usefulness has ended and they themselves will perish. Consequently it is a radical mistake to endeavor to destroy or remove the bacteria in a water which is not yet free from dead organic matter which might still become objectionable. It would equally be a mistake not to endeavor to destroy the dangerous pathogenic bacteria.

It has begun to look irrational to remove a certain percentage say 99 per cent. of the bacteria, leaving 1000 where there were 100,000 or one when there were 100, instead of leaving a definite maximum number, such as 100 per c. c., as was proposed by Koch, to indicate that the water was sufficiently pure to starve out entirely the low life which it contained.

The recent success in destroying the least resistant pathogenic bacteria by small doses of hypochlorites added to the water supply, has opened up a promising field in the effort to destroy one class and still make use of the other.

Practically, we have already begun to act along this line, first by utilizing the bacterial life naturally present in polluted waters or sewage, for the destruction of the relative large quantities of organic matter contained therein, and finally, when only very small quantities of organic matter are left, by applying artificially, a destroyer for the less hardy pathogenic bacteria, should any have survived the previous ordeal. Not only is economy served hereby but there is also a better assurance given that all the malefactors have been removed.

In conclusion it may be said that while the progress in sewage disposal has been rapid and satisfactory in a number of directions and while we are now endeavoring to provide for an oxidation of the liquid matter and a preliminary treatment of the separated suspended matter, it remains yet to work out some of the details of both processes, so as to get the best effects at the least cost.

RUDOLPH HERING.

New York City.

SPECIAL ARTICLES

THE HYGIENE OF THE SWIMMING POOL.*

By JOHN W. M. BUNKER, A. M.,
Brown University.

Of late years the general use of swimming pools has brought up a new problem in sanitation, the problem of the hygiene of the swimming pool. It has been suggested that the swimming pool may be a source of danger as well as one of benefit to the user. To remove such possible danger has been the purpose of the experiments here described. All work was done on the pool at Brown University.

This pool is seventy-five by twenty-five feet, three and one-half feet deep at one end and eight at the other, giving a total capacity of approximately seventy-five thousand gallons. The pool is emptied, cleaned, and filled from the city mains once in three months. The water is kept at a temperature of 68° F. The cost of the water necessitates the using of the pool water over and over. Therefore, at the opening of the pool in 1903, there was installed a gravity sand filter which proved inefficient, clogging repeatedly.

In 1908 a new filter was installed similar to the one at Amherst College, designed and built by the Norwood Engineering Co. This plant combines a settling basin and sand filter of six feet in depth, grading from 2 inch crushed rock to fine sand.

The water from the pool is at present drawn off at the rate of 125 gallons per minute, and pumped into the sedimenting tank, where once a week three pints of alum are added as a coagulant. The course of a particle of water through this tank is about twenty feet, due to the arrangement of baffle-beams. The outflow is spread through a butterfly valve over the surface of the sand filter, whence it goes down through and into the pool. Under this system an amount of water nearly equivalent to the content of the pool is passed through the filter each day, the pump being

*Read before the American Association for the Advancement of Science, Boston, Dec. 27, 1909.

run from 9 A. M. to 6 P. M. This method of filtration keeps the water in the pool clear and of good color but has little effect on bacterial content, although the efficiency of the filter is good.

Samples taken from the surface of the pool three feet above the inlet, after a period of fifteen hours' quiet, show counts of from 300 to 400 bacteria per cc. when grown on agar at 37°. At the same time samples from the deep end of the pool showed counts of from 400 to 500. Samples from the deep end when it is stirred up by those using it, show a content of from 500 to 1000. These analyses show that under this system of filtration, purification is incomplete.

Under such conditions there must ever be danger of transmission of disease. In the time that the pool has been in use at Brown it is true that there have been no epidemics of disease that could be even remotely connected with the use of the swimming pool. Cases of nose and ear affections have occurred occasionally among members of the swimming team which may or may not have been due to infection in the pool. Others have traced cases of this sort directly to swimming pool infection.* Meagre as are the statistics of disease contracted in this way, the danger of infection from a pool used by many, in which the bacterial content is not frequently destroyed or greatly reduced by some adequate means, is surely very real. The colon organism is known to flourish for long periods in water, and its sister organism *B. typhosus* has the same tendency. One can never tell when a carrier case will infect such a pool, and the warm water would offer an inviting habitat for the sojourn of the germs.

The swimming pool, then, must ever be a menace unless preventive measures can be applied to overcome this danger. Inasmuch as filtration as usually employed yields only partial purification, the alternative seems to be disinfection. Disinfection by heat is out of the question because of the expense. Disinfection by chemicals would be applicable could one be found which would be unobjectionable to those using the pool. Different chemicals have been tried out at the Massachusetts Institute of Technology in the case of sewage, and as a result of these experiments the practical application of chlorine as a disinfectant has been made in the case of the sewage and drinking

*Carolus M. Cobb, M. D., Boston Med. & Surg. Jour., July 2, 1908.

water. We have endeavored to apply these results to the water of the swimming pool.

Two-litre samples of swimming pool water were treated with hyperchlorite of lime in the ratio of one part of available chlorine to 1,000,000 of water. The original bacterial content of 700 per cc. was reduced to 0 in fifteen minutes. The same experiments were repeated using one-half the amount of lime. Of six samples of treated water taken fifteen minutes after the addition of the chemical, two each had 1 colony per cc., and the others were sterile. All samples were incubated at 37° for twenty-four hours.

The result of these experiments seemed to warrant the trying of the same experiment on the pool, and it was accordingly treated with hyperchlorite of lime in the strength of 1 part available chlorine in 2,000,000. No odor was noticeable in or out of the water nor was there any perceptible taste. The lime was finely pulverized, placed in a cheese-cloth bag and dragged about the pool until distributed. Surface samples before disinfection yielded a count of 500 per cc. Three samples after 15 minutes yielded a count of 30 per cc. After thirty minutes the count was 10. After one hour there was complete sterility. A sample eight hours later, when the pool was still in motion from those who had entered it, showed a content of 5 per cc. The pool remained practically sterile for four days, whereupon the count began to steadily rise. A second experiment yielded practically the same curve of purification.

From these results it would seem that the application of hyperchlorite of lime offers at once a cheap, efficient, and convenient method of insuring a hygenic swimming pool.

THE SPREAD OF SCARLET FEVER AND DIPHTHERIA IN SCHOOLS.

By CHARLES V. CHAPIN,
Superintendent of Health, Providence, R. I.

The public, and most health officers, are inclined to consider the intercourse of children in schools as a common cause of the spread of these diseases. This view is encouraged by the fact that during the summer time, when the schools are not in session, there are usually much fewer cases than at other seasons of the year. English statistics published, year after year, particularly those of London, show that there is a decrease in the prevalence of scarlet fever and diphtheria during the summer vacation, which in England is only for four weeks in August, and that this is followed by an increase when schools open. It also appears that the seasonal variations are more marked in children of school age than in those younger and older. Kerr,* the Medical Officer of Education of London, has given this subject much careful study, and his conclusions are not in accord with popular notions. In 1907 he† had shown that a considerable part of the reduction in reported cases was due to the absence from London during the holidays of many children of school age. Thus the absence from London represented about 18 per cent. of the holiday period, which accounted for the larger part of the 29 per cent. reduction in scarlet fever and diphtheria. A more intensive inquiry, made in Battersea (London), in 1909, showed that many light cases are not seen by a physician, and are missed entirely during the holidays, but are, during school time, discovered by the "attendance officer" who visits the houses of the children to discover the cause of absences. These two causes, the absence of children from the city, and the "missing" of cases, seem to account for most of the apparent decrease in reported cases which occurs in the holidays. The increase in cases after the opening of school was shown not to be the result of school

* Rep. of Med. Officer (Education), London, 1909, 63.
† Rep. of Med. Officer (Education), London, 1907, 31.

attendance. Thus the reported cases of diphtheria at school age in the first week of school was for all London 27, and for the second week 99. But these 99 cases were carefully investigated, and it was found that in 69 there had been no case of diphtheria in the school within one month. In fifteen instances there had been a case in the school within one month, but none in the same class (room?), and no connection could be traced, and in some instances infection out of school was discovered. Two cases, sisters, in one school proved to be the cause of subsequent cases, and three other cases in one school were due to carriers. Thus the assumed excess of 52 cases due to school infection, an increase of practically 100 per cent. was shown by detailed study to be really ten per cent. The three cases in one chool were due to carriers, and Kerr suggests that a part of the increase in scarlet fever and diphtheria in the autumn may be due to the cumulative effect of "missed" cases occurring during the holidays, may of which cases, he shows, would have been discovered by the attendance officer if the schools had been in session.

Kerr has also shown that the diseases under consideration spread chiefly by contact infection, which is the view now generally held by health officials, and that the conditions for this contact infection are far less favorable in school than out. Twenty-six scarlet fever cases which had been attending school were only discovered when desquamating. Only two cases developed from these 26. The danger to be apprehended from infection of the schoolroom itself is practically nothing, and the routine disinfection "of unoffending tables, chairs and floors" is deprecated. In the twenty-six instances of scarlet fever cases in school mentioned above, disinfection was performed only twice, on request of the sanitary authority, and it happened that one of the two secondary cases was after disinfection.

A tabulation was made of the reported cases of scarlet fever and diphtheria in Providence among school children for the five years ending in 1908.* This showed that scarlet fever exhibited a marked decrease in each year BEFORE the summer vacation, and that diphtheria decreased in three of the five years. In half the instances the autumnal increase in these diseases began BEFORE the schools opened, and in one other instance the increase of scarlet fever

*Rep. of Supt. of Health, Providence, 1908, 20.

was delayed until a month after the opening of schools. As the beginning and the ending of the summer drop in these two diseases is thus shown to be independent of school sessions, there is no reason for assuming that the decrease is at all dependent on the closure of schools. A study of the curves indicates that the decrease of scarlet fever and diphtheria in the summer time is correlated with the temperature, but not through the schools.

A similar study of the seasonal distribution of ALL cases of these two diseases for the ten years ending in 1903 shows that the beginning and ending of the summer decline has no apparent causal connection with school attendance, as it usually precedes instead of follows the opening and closing of the schools. The relation is no more marked when school children alone are studied than when all cases are considered.*

The period of incubation of scarlet fever and diphtheria is so short that if school attendance has any influence on the spread of these diseases it is not impossible that the short vacation of a week to ten days may have a noticeable effect. Indeed it is frequently alleged that such an effect is easily seen. But in Providence there was a decrease of these diseases 21 times in the week following the short vacation, an increase 20 times, and the number of cases remained the same 8 times. The study of school children alone, 1904–8, showed a decrease after the vacation 9 times, an increase 13 times and the same number of cases 4 times.

For the purpose of studying the incidence of these diseases in schools in Providence sets of cards are kept, one set for scarlet fever and one set for diphtheria, with a card for each school. On these cards is noted every case of the disease which develops in a pupil attending the school, and also every case of the disease which develops in the family though not in the person of a pupil. By this means any excess of the disease in a school is at once noted. In Brighton, England,† a large chart is kept in the health office on which is noted against each school the cases of contagious disease therein occurring.

By these means it is found that outbreaks do occur in which cases of scarlet fever and diphtheria develop from contact in school, or perhaps more often during recess, or while the children are

* Rep. of Supt. of Health, Providence, 1903, 112.
† Rep. of Med. Officer of Health, 1910, 10.

coming or going. That a certain number of cases are reported among the pupils of a school does not necessarily prove that they have any relation to school attendance. An investigation of the cases shows that often they are, either certainly or probably, due to neighborhood rather than school contact. Yet school outbreaks do occur. During the past 26 years there have apparently been in Providence twenty such outbreaks of diphtheria and eight of scarlet fever.

Another reason for doubting that school attendance greatly influences the prevalence of scarlet fever and diphtheria is that these diseases are more common in children under school age than they are among those of school age. The following table shows the age distribution of the reported cases of scarlet fever and diphtheria in Providence for twenty-one years:

DIPHTHERIA.

1889–1909

Under	1 year	197
"	1 year	491
"	2 years	738
"	3 "	795
"	4 "	813
"	5 "	764
"	6 "	775
"	7 "	665
"	8 "	565
"	9 "	463
"	10 "	371
"	11 "	333
"	12 "	285
"	13 "	200
"	14 "	147
"	15 "	119
"	16 "	105
"	17 "	94
"	18 "	79
"	19 "	67
"	20 "	79
Adults		1219
		9364

SCARLET FEVER.

1889–1909

Under	1 year	264
"	1 year	528
"	2 years	891
"	3 "	1097
"	4 "	1090
"	5 "	1171
"	6 "	1141
"	7 "	1027
"	8 "	868
"	9 "	713
"	10 "	577
"	11 "	418
"	12 "	362
"	13 "	245
"	14 "	227
"	15 "	149
"	16 "	128
"	17 "	121
"	18 "	74
"	19 "	69
"	20 "	58
Adults		640
		11858

It will be observed that the amount of disease increases until the first year of school attendance when it begins to fall off. It is remarkable if school attendance has sufficient influence to cause the autumnal increase in these diseases as is so often alleged, that it has not sufficient influence to at least keep up the disease after children reach the age when they begin to go to school.

While it appears to be true that the diseases under consideration rarely spread in schools, and that the schools are safer than the streets, yet a certain small amount of infection probably does at times take place in school. This of course should be guarded against by taking every reasonable precaution. It is probable that the rules in regard to the school attendance of children from families where these diseases exist, are in most of our cities, amply sufficient to prevent extension from reported cases. Indeed these rules are probably often unnecessarily stringent. Disinfection of the school is, generally speaking, a useless procedure. The trouble comes not from the recognized cases but from the "missed cases" and healthy "carriers." How to discover these, and what to do with them, is an unsolved problem. It is true that the medical inspection of schools has resulted in the discovery of some cases that would otherwise have been missed, and that it is probable that the increasing interest of the teachers will discover more of them. But the carriers, and indeed some mild cases, are likely never to be discovered. To prevent harm from such, it is necessary to reduce to a minimum the chances for the exchange of saliva and other secretions. The common drinking cup must go. The use of the slate encourages carelessness with the saliva. Each child should have its own pencil and they should not be exchanged. The roller towel is almost as bad as the common drinking cup. The teacher must teach personal cleanliness by precept and example. If she licks her fingers to turn over papers, or moistens her pencil on her lips, she is teaching the children to exchange saliva and innoculate themselves with diphtheria bacilli. The use of modeling clay and sand, and much other kindergarten work, encourages personal uncleanliness and suggests that human secretions are in no way harmful. If, however, the child is taught to wash its hands, and wipe them on its own towel, before touching the clay, and to keep the fingers out of the mouth while modeling he will learn that it is wrong to inflict his own saliva on another. By such teaching the spread of contagious diseases in school may be made even less than it is.

WATER-ANALYSIS AND THE PUBLIC HEALTH.*

By DR. D. G. REVELL,
Provincial Bacteriologist, Edmonton, Alberta.

(EDITOR'S NOTE.—Every public hygienist is probably called upon more or less frequently to explain to members of the laity just what a sanitary water analysis means and under what conditions the results obtained are of value. The above paper, written for a lay audience, presents these facts so clearly and concisely that the Editors of this Journal present the paper in full.)

As the population of a community becomes denser, so-called public utilities become increasingly more vital to the well-being of the citizens, and I believe that among these utilities I may safely give the water-supply first place in importance. No other one thing is so great a factor in public health, and the greatest resource of any nation is the health of its people. This it is that conditions the enjoyment of the other resources of the country and the status of a nation among the powers of the world. When malaria invaded Greece and depleted the health and vigor of the people of that wonderful nation to which modern civilization owes so much, her power rapidly waned and disappeared. Before the health of the inhabitants of the Panama canal zone was made secure by the adoption of intelligent sanitary measures which practically abolished yellow fever, typhoid and malaria, the work of construction of the canal was carried on under such difficulty owing to sickness and death that success was impossible.

Among the great resources of the Province of Alberta the health of her people must be reckoned as first. The conservation of this basic resource of her people is fundamtenal to the full development and realization of all her other resources. In this work of conservation the Union of Alberta Municipalities can and will play a large part.

At the outset of what I have to say it may be well to define the two chief terms in the title of this paper. By "water-analysis" is here meant the examination of water by laboratory tests to ascertain certain data which aid in forming an opinion as to the sanitary quality of the water, that is, its fitness for domestic purposes.

* Read before the Union of Alberta Municipalities, Wetaskiwin, Alberta, Sept. 7, 1910.

"Public health" is perhaps most easily defined as the object of public hygiene which in turn can not be better defined than in the words of Sedgwick.*

"Public hygiene is the science and the art of the conservation and promotion of the public health. It has for its function the prevention of premature death and the promotion of normal life, health and happiness in communities, chiefly by the elimination or amelioration of unfavorable environmental conditions common to many persons or communities either at one time or at different times. It includes especially hygienic problems common to groups or communities, such as camps, villages, towns and cities, e. g., water supplies, drainage, milk supplies, ice supplies, the control of infectious diseases, heating, lighting, ventilation, school sanitation, municipal sanitation and the like."

The laboratory tests above referred to comprise physical, chemical, microscopical and bacterial examinations. In addition to these the thorough study of a water includes the medical question of its biological effects and such engineering questions as the available quantity, head, feasibility for use as compared with other possible supplies, etc. This comprehensive study of water-supplies may be termed "water-investigation," and is most effectively carried on by the co-operation of bacteriologist, chemist, physician and engineer.

A mention of some other kinds of analysis of water will serve to make clearer by contrast what sanitary analysis is. Thus there is mineralogical analysis of water to determine exactly the mineral substances which are dissolved in it, and which may have medicinal or commercial value; also boiler-analysis to decide as to the suitabliity of a water for boiler use; commercial analysis of water intended for industrial purposes such as dyeing, brewing, etc. It is a serious but common mistake to look upon sanitary water-analysis as similar to these others, or like the assay of an ore, and to expect it to be carried out under the same conditions as are appropriate for these.

Says a well known authority† on water analysis:

"A great deal of popular misconception exists upon the subject of the analysis of potable water, and it is commonly supposed

* "Principles of Sanitary Science and the Public Health," by W. T. Sedgwick, McMillan Co., New York.

† W. P. Mason, page 1, "Examination of Water," Jno. Wiley & Sons,

that such an examination may be looked upon from practically the same point of view as the analysis of an iron ore. That this belief is founded on fallacy may, however, be readily shown. When an iron ore is submitted for analysis the chemist determines and reports upon the percentages of iron, phosphorus, sulphur, etc., found therein; and at that point his duties cease, inasmuch as the ironmaster is ordinarily capable of interpreting the analysis for himself. Even should the analyst be called upon for an opinion as to the quality of the ore, the well known properties of the several constituents make such a task an easy one, and assuming the sample to have been fairly selected, the opinion may be written without any inquiry as to the nature of the local surroundings of the spot whence the ore was taken."

All natural waters are pure water plus chemical substances and living organisms, dissolved or suspended in the water. Ordinarily the chief chemical substances in water are:

(1) Gases occurring in nature, such as oxygen, nitrogen, carbon dioxide and ammonia;

(2) Liquids, as for example, organic acids;

(3) Solids, such as lime, magnesia, iron and various organic substances.

The living organisms are:

(1) Bacteria and other small and simple forms of plant life such as algae and diatoms;

(2) Low forms of animal life, so-called animalculae or infusoriae. These and the algae and diatoms are examined for by the use of the microscope.

(3) Higher forms of animal life, (insects, worms, fish) are also found in water but are not ordinarily taken account of in analytical work. Of these various contents of water those of most interest here are:

(a) Chemical substances not in themselves harmful in the minute amount usually present but whose presence is indicative of the possible dangerous bacterial contamination of the water. These are determined by chemical analysis.

(b) Certain kinds of bacteria, either themselves dangerous to health, or probably accompanied by such and hence indicative of contamination. These are determined by bacterial analysis.

As it is the numbers as well as the kinds of bacteria present that guide in judging the character of a water, and as both these features (numbers and kinds) change soon after a sample is bottled, in the thorough study of a water-supply it is necessary to begin the bacterial examination in the field (i. e., in the locality where the water-supply is). A bacteriologist must visit the source, take the samples and "plate" (or plant, make cultures of,) them there. The cultures can then be transported to the laboratory for examination and study.

The bacteria in water may be put in three classes:

(1) Normal water bacteria which are always present and are harmless. Their number varies according to the amount of suitable food for them in the water and differs greatly in the various kinds of water according to source, and even within the same class of water, especially as the season changes.

(2) Harmless aliens, derived from the soil and to be regarded with suspicion as they are likely to be often accompanied by the next class.

(3) Harmful aliens, from sewage or bad soil, i. e., really of animal origin and hence condemning the water absolutely. The alien bacteria tend as a rule to disappear sooner or later from water by so-called "self-purification."

Harmful mineral constituents usually render themselves self-evident by the taste of the water or by their effect on the users of it. If a water disagrees, no amount of analysis will reconcile the users of it to its special effects. It is astonishing how often people ask the analyst to tell them what they already know most unmistakably, namely, that a certain water is good to drink or is not. Analysis is ordinarily necessary and justifiable to ascertain the presence only of concealed dangers. In the great majority of cases the dangerous character of a water is readily evident to the eye. As President Brown of Lehigh University said: "It does not require a chemical examination to decide whether a stream has been polluted by sewage when one can see the sewage flowing into it."

For sanitary analysis a true sample is absolutely necessary, that is, a sample which exactly represents the water as it exists in its source or as consumed. "Chemical analysis" is an extremely delicate process, estimating constituents in parts per million and

expressing these to one or two places of decimals. It therefore shows as minute amounts as one part in 10,000,000. Hence it is absolutely necessary that water samples be properly taken in the first place, in suitable and perfectly clean containers and properly cared for until brought under examination. Some of the substances tested for readily become altered after bottling the water, but these changes can be minimized by adding a small quantity of chloroform to the sample and keeping it cool.* The bacterial content of a water is even more susceptible to alteration than the chemical. A bacterial sample can not be treated with a preservative but must be kept cool by packing in ice. There are always numerous bacteria of several kinds present in even small quantities of the best of natural waters. The number is usually estimated and stated for one cubic centimetre amount (about one-sixteenth of a cubic inch). A water is free from living bacteria only after being sufficiently heated or when it contains germicides or substances which destroy bacteria. The numbers and kinds of bacteria in a water sample are ascertained by culturing, a process analogous to the determination of the numbers and kinds of minute seeds present in a quantity of soil by germinating and growing the seeds into full-sized plants.

The requirements, purpose and limitations of a water-analysis must be kept clearly in view by those making use of it. The analytical findings apply strictly only to the sample and indirectly to its source only in so far as the sample at analysis is truly representative of the latter.

The findings from an analysis of a sample do not apply to the past nor the future state of the source of the sample; and herein is one of the most common popular mistakes in regard to the possibilities in water-analysis, viz., it is commonly thought that an analysis is an easy and certain means of determining whether a given water has been the cause of typhoid fever. That such is not the case, however, readily appears when it is known that typhoid infection of water is usually temporary and the disease does not appear generally for two to four weeks after the person takes the germs into his mouth. A week or two more elapses before the disease can be definitely recognized. Then some

* Directions and outfits for sampling are furnished to proper authorities by the Provincial Laboratory.

further time passes before a sample is taken for examination. Thus a period of seven or eight weeks usually intervenes between the drinking of typhoid infected water and the subjecting of the water to analysis. Meanwhile all trace of the contamination may have disappeared, leaving the water apparently quite innocent. Moreover, if the examination could be made at the right time even the most careful examination may fail to detect typhoid bacilli that are actually present. In the routine bacterial examination of water we try to ascertain the number of colon bacilli present. These are the most abundant kind of bacteria in the colon (or large intestine) of animals, hence they abound in animal excreta and being hardy and rather easy of detection they are utilized as a test for excretal contamination. Typhoid bacilli are not nearly as hardy as colon bacilli, and are also extremely difficult to isolate and identify. Hence we examine usually only for colon bacilli. From their number the possibility and probability of typhoid germs being present is deduced. Even then we must remember that water may be infected by urine alone and colon bacilli then may be absent or present only in such small number as to afford no indication of the true state of the water. The urine of a person who has had typhoid may contain as many as 500,000,000 typhoid bacilli in each cubic centimeter. A single stool or bowel-movement of a typhoid patient may contain 1,000,000,000 (one billion) typhoid germs. Typhoid bacilli often get into the gall-bladder during an attack of this fever. They may persist there for years and be given off by the individual continually or occasionally, although his health may be perfectly good all the while after his recovery from the fever.

According to their source natural waters may be divided into the following kinds:

(1) Aerial: (a) Rain-water, snow and hail.

(2) Surface: (a) Ponds and lakes; (b) Streams and rivers; (c) Ice for domestic use may well be included also here, although its bacterial character, and to a less extent in its chemical, it is more akin to aerial water.

(3) Subterranean: (a) Shallow wells; (b) Deep wells and springs.

The numbers and kinds of bacteria and the kinds and quantities of chemical substances normal to these various classes of

water are different for each sort and even within one class the constituents may vary within considerable limits without actual contamination being present. In order, therefore, to interpret a water-analysis (that is to understand its significance) it is absolutely necessary to have certain data, viz., such a description of the source and environment of the water as will indicate the significance of the amount of each constituent determined in the analysis. A standard author (Mason, quoted above) says about this:

"Thus the numerical results of a water-analysis are not only unintelligible to the general public, but are not always capable of interpretation by a chemist unless he be acquainted with the surroundings of the spot whence the sample was drawn, and be posted as to the analytical methods employed.

"It is very common for water to be sent for analysis, with the request that an opinion be returned as to its suitability for potable uses, while at the same time all information as to its source is not only unfurnished, but is intentionally withheld, with a view of rendering the desired report unprejudiced in character.

"Such action is not only a reflection upon the moral quality of the chemist, but it seriously hampers him in his efforts to formulate an opinion from the analytical results.

"As Nichols has well said, 'It is a great mistake to suppose that the proper way to consult a chemist is to send a sample of water in a sealed vessel with no hint as to its source. On the contrary, the chemist should know as much as possible as to the history and source of the water, and if possible, should take the sample himself.'

"It was years ago laid down as a golden rule 'never to pass judgment upon a water the history of which is not thoroughly known,' and the nearer this maxim is lived up to today the fewer will be the mistakes in the reports issued.

"A water-analysis, on the other hand, is really not an analysis at all, properly so called, but is a series of experiments undertaken with a view to assist the judgment in determining the potability of the supply."

The popular tests by which the quality of a water is judged are its odor, taste and "appearance" (or color and clearness). These tests are utterly unable to distinguish between a safe and an

unsafe water and may condemn a perfectly safe water and accept a very dangerous one. Thus, odors commonly attributed to sewage pollution may be due to either living or decaying algae and diatoms (two classes of water plants) or infusoriae (so-called "animalculae," minute forms of animal life) and an ill-smelling water may be quite harmless and safe to drink.

The general purpose of sanitary water-investigation is to safeguard the public health as dependent on purity of water-supply. The specific purposes of the analyses made in this Province are:

(1) To ascertain the suitability for domestic use of given water-supplies, or

(2) To ascertain if the water is concerned in carrying or causing disease.

(3) To obtain "comparates" for Alberta waters. ("Comparates are analytical findings in water from various sources known to be uncontaminated.) If a doctor were asked what is the matter with a person who weighs 250 lbs. he would, before answering, wish to know the person's height, age, sex, weight in the past, etc. The person might be perfectly well. Just so when we attempt to determine the sanitary quality of water it is necessary to have other analyses and other data besides the analytical figures from the sample under judgment. We must know what is usual (or "normal") for unpolluted waters of the locality and class in question at that season of the year. This is determinable only by numerous examinations, giving what are known as comparates. These are absolutely necessary to the interpretation of a chemical sanitary analysis of water.

A reliable opinion as to the sanitary status of a water-supply can be rightly formed only upon the following data:

(1) The history of the use of the water, especially its effect on health.

(2) The data from intelligent, exact and thorough sanitary and topographical inspection of the environment of the water.

(3) Comparates for the locality, class of water and season in question.

(4) The analysis of proper samples of the water.

Of these four requirements the first two are more necessary than the last two, and are generally more easily and quickly obtainable.

The effects of the use of a given water on health is a biological test and is one of the most crucial tests to which the water can be subjected. It is moreover, a test which has already been made usually before any other test is asked for. In one instance I was asked to examine the well-water of a family in which there were then six cases of typhoid. For months previous to the onset of these cases the well-water was also used by a lot of other persons, none of whom developed typhoid. This was a biological test that exonerated the well at once quite clearly and much more certainly than all the chemical and bacteriological tests could have. Indeed these would have condemned the well for it was just beside the barnyard and the stand or well-cover had openings (for the rods of the double force pump) through which the manure brought there by the farmer's boots was being washed every time water was pumped. It was winter and one could see the manure right there on the ice, being washed down into the well every time water was pumped. Seeing is believing and it required no analysis to prove that that well certainly was both chemically contaminated and also contained plenty of colon bacilli. Yet it played no part in the typhoid outbreak for which it had been blamed. Probably none of the colon bacilli in the well came from human excreta. There is no way of distinguishing between colon bacilli from various animals. A brief study of the cases in this outbreak revealed an unsuspected "walking case" as the originator by contact.

Water-analysis is unfortunately the subject of the grossest misconceptions in the popular mind not only as to the why and the how of undertaking it and as to the application of its findings, but even as to what supplies are proper objects of such attention. Briefly these latter are:

(1) Supplies proposed for public use, or extension of public use, and

(2) Public supplies in use and justly under suspicion of causing disease. A water is justly brought under suspicion by what may be compared to the general examination which a doctor makes of a patient before he ventures any diagnosis. This general study often either gives the water a "clean bill of health" or unmistakably condemns it without recourse to the laboratory tests

which are frequently uncertain in their significance and should follow, not precede, the general study mentioned.

Laboratory examination of public supplies proposed for new use or for extended use has regard to color, odor, taste, turbidity, hardness, (or soap-consuming power), alkalinity, total dissolved solids, chlorine and iron; also free ammonia, albuminoid ammonia, nitrites and nitrates. Of these various chemical contents the iron and the hardness are in themselves directly important and significant. The others are merely suggestive of the possibility of the presence of dangerous bacteria. In addition to the quality of the water as indicated by the analysis there should also be ascertained: (a) The quantity available and whether sufficient for present and future purposes; (b) The environment of the water, both the present actual and the probable future conditions to which the water supply will be exposed; (c) The cost to install, maintain and operate the necessary works to handle the water. A careful inspection or topographical survey of the source of the water should never be omitted and should put contamination out of the question as a possibility, or at least as a probability, before the water-supply is adopted, unless no other is available and means to purify it are incorporated into the waterworks system.

There is a great deal of popular error as to the possibilities in water-analysis. I think the chief reasons for the mistake are:

(1) In many instances of typhoid epidemics, sensational results have been got by thorough investigations of the water-supplies at fault—the public have regarded these investigations as consisting merely in analysis of the water, although the analysis of the water may in many instances have quite failed to prove the water at fault. In other words, the general public, and even many medical men, have confounded water-analysis and water-investigation. The latter includes the former and much more.

(2) Water-analysis proper has been confused by the laity with other analyses which are absolute in their findings and do not require interpretation.

(3) Water contamination is usually temporary but the uninformed think analysis of a sample shows all the past history of its source.

Two somewhat common and very serious mistakes are, first, to regard water as always to blame for typhoid and, second, to

rely solely on water-analysis to discover the part played by water in typhoid outbreaks. Typhoid infection always comes to its victim more or less directly from another human being. The germs are carried by various agencies of which the most common are water, milk, flies and fingers. But water can not originate the germs of typhoid, neither can milk nor even the much-blamed but usually innocent "unsanitary conditions," broken sewers, etc. Perhaps the most common way in which typhoid is communicated in Alberta is by contact, i. e., close association with a person either sick with typhoid fever or still harboring the germs after an attack. It has been discovered in recent years that of every hundred persons who recover from typhoid some four continue to give off typhoid germs in their excreta for years afterwards. These are termed "typhoid-carriers," and they may cause mysterious outbreaks of typhoid by infecting water, milk or food. Such persons are especially apt to cause outbreaks of typhoid if employed as cooks or as dairy-workers. The infection may be carried by flies from exposed contents of privies used by such persons. The lesson from this is to regard all human excreta —both urine and faeces—as dangerous. In every community there is almost certain to be one or more typhoid-carriers, and as early as possible every municipality should establish a public waterworks system and a sewerage system and enforce their use by all householders, thus abolishing the death-dealing privy and private family well.

As regards the mistake of relying too much on water-analysis to discover the cause of typhoid I shall only point out that in the investigation of typhoid outbreaks the question to be answered is not merely "Is the water to blame?" but "What are the sources and channels of the typhoid infection in this instance?" This question can be answered only by a competent investigation by a trained and experienced man, an epidemiologist, (one who investigates epidemics). In the course of such investigation it may be found advisable to have water-analysis, but this should neither begin nor end the enquiry.

Water analyses are often asked for in connection with suspected conveyance of disease by drinking the water. In these instances if there is any real reason for suspecting the water, the result of analysis should, of course, not be waited for before apply-

ing measures to render the water safe. Not to analyse but to sterilize is the first requisite in dealing with suspected water. This may now be rather easily, quickly and simply done by the hypochlorite treatment. The full investigation of the water may then be proceeded with deliberately and with the comforting assurance that any danger in the water has been eliminated.

To sum up briefly the points I wish to emphasize:

(1) Pure (i. e., safe) water-supplies are a first requisite for the public health.

(2) In the selection and protection of public water-supplies, comprehensive water-investigations are necessary.

(3) Water-analysis is an essential part of water-investigation.

(4) To have any real value water-analysis must be carried out with exactness and rigid care. Proper samples are absolutely necessary.

(5) The results of every analysis must be "interpreted" before they are understood or are of practical value.

(6) The interpretation can be made only when we have comparates and full data regarding the source of the sample.

(7) Such comparates and data are obtainable only by systematic work, carefully planned and carried on over a long period.

(8) Unity and economy of such work can not be secured if it is left to haphazard local events. It can be successfully carried on only by a Provincial organization with the necessary machinery and authority for such investigative work.

FUNCTIONS OF A PUBLIC HEALTH LABORATORY.*

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Preventive medicine occupies an increasingly important and large place in the history of modern medicine. In this growth and development laboratory investigation has played a large part. The present is seeing an extension of its methods and their application. The future will see this continue until not only diagnosis but also the application and results of treatment will be subject and subjected to laboratory control. Laboratories are of various kinds. That properly termed a public health laboratory is of a special kind and in order that it may serve its maximum of usefulness there must be a clear understanding of its relationship, requirements and limitations and this understanding must be shared alike by those who originate and maintain it, those who conduct it and those whom it serves. Otherwise there must result cross-purposes, misunderstandings and dissatisfaction. In what I have to say to you today my endeavor is not so much to add anything new to ideas regarding the functions of a public health laboratory as to emphasize certain phases of the relationship of its work to the work of the daily practitioner. I shall first enumerate the chief functions of such a laboratory, then briefly discuss these separately, necessarily without any attempt at an exhaustive consideration. And in the beginning let me confess that I shall take liberties with the title of my paper and digress frequently beyond what may seem the strict boundaries.

FUNCTIONS. Broadly speaking the functions of a public health laboratory are concerned with health matters of public interest, i. e., with public utilities related to health and with diseases that menace the public. By public is here meant more particularly the well or healthy people. Note that it is "public health," not "public sick people's laboratory." Specifically these matters of public interest are, first, infectious diseases; second,

* Read at Provincial Medical Association at Calgary, Alberta, Aug. 19, 1909.

public supplies of water, milk and food; third, sewage disposal; fourth, the production of vaccine, antitoxic sera and antirabic treatment; fifth, education of the public re public health and disease; sixth, research in the preceding fields. In regard to infectious diseases the function of the laboratory is (1) to discover foci (or "seed-centers") of infection of the naturally communicable diseases of man and (2) to discover if possible the channels and agents by which the infection is spreading in any given outbreak. The endeavor to discover foci is made by the laboratory examination of material from suspected cases. This endeavor is necessarily limited to those diseases furnishing material in which infection can be recognized and for which there are practicable laboratory methods. The chief of these are pulmonary tuberculosis, diphtheria, and typhoid fever, in man, also tuberculosis, glanders, rabies and anthrax in domestic animals. To these might be added malaria, syphilis, gonorrhea, (including ophthalmic), smallpox and other contagious diseases in which laboratory findings may aid in diagnosing.

The exact significance of the laborarory report should be always kept clearly in mind. The ultimate purpose of the examination is the protection of the well people who might be exposed and it is chiefly to this end that it aids in the curative treatment of the sick person. Thus, if everybody had pulmonary tuberculosis we would not make public examinations of sputum for the presence of bacillus of tuberculosis. To illustrate and make this more evident and also to bring out some other points I shall discuss in some detail the purpose of the work of the laboratory on some of the diseases enumerated above and more espccially the significance of positive and of negative reports. Sputum from a case of suspected pulmonary tuberculosis is examined to find an answer to the question "Is this sputum dangerous to the public health?" and a positive report on the presence of tubercle bacilli in sputum means: "This sputum is infectious and should be dealt with accordingly." The neglect to apply proper preventive measures in the case of a patient whose sputum is reported positive for tuberculosis is, therefore, the failure to realize the essential purpose of the laboratory. To state it another way: Sputum is examined for tubercle bacilli not merely to answer the question, "Has the person whose sputum this is, tuberculosis?" and a

negative report on sputum merely means "This sputum is not found to contain tubercle bacilli." It emphatically does not mean and never should be taken to mean that the person has not tuberculosis, even tuberculosis of the lungs.

Sputum examination may have quite another application which by contrast serves to emphasize its real bearing in public health work. Thus it may be made with reference to a life-insurance risk. I think you will agree that this is not a matter of public health. In order that a positive finding may be had for a given sample of sputum the following conditions must be fulfilled: (1) The person must have tuberculosis of the lungs; (2) The disease must have progressed to the extent of breaking-down of tissue; (3) There must be sloughing off into the air-passages of this tuberculous material; (4) Such material must be present in the given sample of sputum; (5) The fragment selected from the sample must contain some of this material; (6) It must be successfully stained; (7) Brought into the field of the microscope; and (8) recognized by the observer. Failure of any one of these requirements results in a negative report which, therefore, should always be interpreted by the Scotch verdict "not proven" rather than "not guilty." Of the above eight conditions to a positive report I think lack of the third or of the fourth is most commonly the origin of a negative finding, i. e., either sloughing off of tuberculous tissue is not occurring or the sample of sputum submitted is not properly derived. It is, therefore, not surprising if occasionally a patient succumbs to pulmonary tuberculosis some time after a negative report has been made on his sputum. This, I think, should hardly be regarded as reflecting on the thoroughness of the laboratory examination. Certainly so far as the sputum examination may be regarded as a means of early diagnosis and a negative report consequently result in neglect of the various means to an actual early diagnosis and of appropriate curative treatment, the sputum examination would well be abandoned altogether for the good of the individual case. Its purpose is not to indicate extraordinary therapeutic measures, but rather that extraordinary precautions should be taken to prevent spread of tuberculosis by the patient and especially that he should adopt proper habits of coughing, sputum disposal, eating, drinking, etc. Of course all sputum should always be regarded as dangerous and

promiscuous public spitting therefore rigidly prohibited and punished by law.

A negative report has a greater value in diphtheria than in either pulmonary tuberculosis or typhoid; in other words, it is easier to exclude diphtheria by bacteriological examination than either of the other two diseases. The diphtheria bacilli are commonly so abundant in the patients' throat and so readily obtained and brought under examination that one is much less likely to miss them than tubercle bacilli in sputum, while the Widal reaction is not constantly present throughout typhoid.

In diphtheria a positive report means: "The liberty of the person from whom this specimen comes is a menace to the public health, therefore, institute or maintain quarantine and other protective measures." Commonly it is taken as signifying that the person has clinical diphtheria and should receive antitoxin. It should be distinctly understood, however, that the clinical diagnosis and the proper curative measures are duties of the attending physician. Laboratory findings are only a part of the evidence on which to base a verdict—sometimes such findings are final and conclusive as to the nature of the disease but never as to the nature of the patient.

Just here I may digress for a moment to make clear an essential difference between the general duties of the private practitioner (family physician) and of the public hygienist or medical health officer. The prime duty of the attending physician is to his patient—*curare tute, cito et jucunde* (to cure safely, quickly and pleasantly). He must "treat the patient and not the disease." The prime duty of the medical health officer is to the public. His essential duty is "treat the disease and not the patient." He must see that the patient is cured safely to the public—and this may not always be pleasantly to the patient—perhaps not even most safely to the patient. Now the patient and his family are a very real and definite quantity—a quantity often of impatience and active resentment towards the measures necessary to the public health. The public is an indefinite quantity often indifferent and ungrateful for the health- and life-saving work of the medical health officer. Only sickness makes us prize health. Here we probably have a large part if not the whole of the explanation of the almost universal unpopularity of the efficient and conscientious health officer.

The investigation of public utilities as bearing on health and disease includes: (a) Epidemiological investigations of outbreaks of disease, especially typhoid; (b) Examination of public water supplies, milk and other foods. Epidemiological investigation should be carried on by a laboratory-trained man, and preliminary to the application of laboratory tests there should always be a thorough study of the entire outbreak, comparable to the clinical study of a case. Thus the investigation of an epidemic should comprise a full anamnesis of the community's health, an accurate study of the present clinical picture of the community and only thirdly and according to the indications of the preceding should laboratory tests be instituted. This order of procedure would not only obviate many useless water-analyses and other analyses, but would give the desired results, would be much more likely to discover the source of the evil and so allow intelligent action to stop or remove it. To endeavor to detect the source of a typhoid infection by resorting immediately to a water-analysis is exactly analogous to an effort to make a diagnosis of any illness by a delicate and exhaustive analysis of the urine as the first step, while entirely ignoring the clinical study of the patient. Both analyses have their value, but their place is certainly not initial. I speak now more particularly with regard to typhoid fever. The source of infection of sporadic or single cases is usually too obscure and such cases too numerous and scattered in this Province to be thoroughly investigated in every instance by a single worker but the first appearance of any sign of an outbreak should at once call for expert study of the situation. I would regard as a sign of an outbreak the occurrence of an associated case. I do not mean, however, that the investigation of single cases should be neglected, I only mean that under present conditions it is not possible to undertake this but it should be aimed at for the future.

The history of each case of typhoid in an outbreak is comparable to a single symptom in an individual case-history. The study of many associated cases is necessary to a proper diagnosis just as the study of the whole symptom-complex is necessary to the exact diagnosis of an individual case of any disease. Seldom is any one symptom pathognomonic, so also a single case-history of typhoid is rarely a key to the source and mode of an epidemic. Correlation of case-histories is here the great essential.

It is possible by keeping close tab on certain data regarding each typhoid case in a community to detect an outbreak very early in its course and even to form a good idea as to the real source of it. Thus milk-, water-, fly-, and contact- or finger-epidemics have each their characteristic features which are rather easily discovered. Such investigative work is as fascinating as criminal detective work—and far more valuable and necessary to the public weal.

The epidemiologist must be an expert, a specialist, if you please, in "community diseases." The local medical health officer has neither time nor usually the necessary special training for successfully doing such work and moreover, in such investigations he is apt to be handicapped by local conditions such as the unwillingness of his fellow-practitioners to give the necessary full insight into their cases. I say this without underrating the high ability and purpose of medical health officers, but we all have our limitations and it is as bad to exceed these as not to work up to them.

Food-analyses for public health purposes are made to determine fitness for human use without endangering health and are desirable for foods that are readily subject to contamination or to sophistication, or as occasion indicates, for disease, unfitness of raw material, use of improper preservatives, etc., as is especially exemplified by milk. In the examination of milk-samples it is possible to determine only certain things, however, viz., the presence and amount of "dirt," the number and kinds of bacteria which are significant as regards local disease of the udder, care of the milk and other diseases of the cow, such as tuberculosis; leucocytes and pus-cells; sophistication such as skimming, watering, and the addition of preservatives; also the amount of butter-fat. This latter is the one thing that is most commonly determined and given attention to. Its bearing is almost purely commercial. As to the "dirt" content of milk we seldom if ever hear a word. If it were generally known, however, that the major part of dirt in milk is manure there would quickly be a more intelligent public demand and sanction for the measures necessary to give us right milk-supplies.

I wish to emphasize that intelligent, thorough and frequent inspection is the only safeguard to a good public milk supply.

The terror of the mysterious bacteriological analysis may be a good thing to hold over the heads of unscrupulous and careless producers and dealers but it should never be expected to take the place of regular inspection.

Certain data regarding each specimen are requisite to realize the full usefulness of the public health laboratory. These data should ensure a thorough clinical study of the case, they form valuable statistical material (in so far as they are accurate), and they serve to bring the laboratory work into correlation with that of the administrative health officer. The laboratory man is a technician. The health officer is essentially an administrator. These two sides of public health service should be clearly distinguished and their workings always be co-ordinated if the maximum of efficiency is to be obtained. This matter of data regarding material may be made clear by a brief reference to venereal diseases. In the bacteriological diagnosis of gonorrhoea and syphilis the public laboratory should, I believe, make free examinations only when the proper data are furnished, including name (or initials) and address of patient, whether married or single, relation to other cases, etc., and when the case if positive, is reported to the medical health officer. If the examination bears only on the treatment of the case, it is a private matter and the patient should pay accordingly. The necessity of proper data is not always rightly understood. If it were there would seldom or never be any hesitation or unwillingness to furnish the information usually asked for.

Water-investigations are a most important function of a public health organization, and are likewise the subject of perhaps the grossest misconceptions not only as to the why and the how of the undertaking and the application of its findings, but even as to what supplies are proper objects of attention. Briefly these latter are (1) Supplies proposed for public use, or extension of use, and (2) Public supplies in use and justly under suspicion. As water is justly brought under suspicion by what I have compared to the anamnesis and clinical picture of a patient, these often either give the water a clean bill of health or unmistakably condemn it without recourse to laboratory tests which are often uncertain in their significance and should follow, not precede, the general study mentioned.

I have been criticized in a friendly way with over-estimating the value and significance of laboratory work and findings. Let me assure you I realize perhaps more keenly than most non-laboratory men how narrow the limitations of laboratory determinations are, and frequently I have to disappoint enthusiasts who ask things that the laboratory does not attempt, either because they are not in the legitimate routine of its work or because laboratory methods have not yet been worked out for them.

To isolate typhoid germs from water is a bacteriological stunt which has seldom been successfully accomplished and is not attempted in routine water work. The colon bacillus is taken as an index to excremental contamination but it is not peculiar to the human intestine and nearly all waters contain it in certain numbers. The number of colon bacilli in a given sample is significant only by relation to that for the comparate for the same class of water.

A COMPARISON OF THE GERMICIDAL VALUE OF A FEW "COMMERCIAL" COAL-TAR DISINFECTANTS.

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In connection with the work of any progressive bacteriological laboratory is apt to be heard many requests for testing the efficiency of some of the countless horde of commercial disinfectants, real or so called. These requests are usually instigated directly by the promoters of these compounds, are frequently accompanied with offers of remuneration and are for the purpose of obtaining the name of the bacteriologist or of the laboratory for advertising purposes. The agent usually produces a flood of literature endorsing his particular disinfectant and showing results of favorable tests made by bacteriologists elsewhere, anywhere. In large cities the headquarters of various departments are often literally besieged by such agents, lured on by hopes of large sales and great profits, and the weight of a favorable report from responsible local experts is of course of great advantage to them.

It has long been the policy of the Boston Health Department not to waste valuable time on these countless proprietary compounds and the rule has been adopted that no bacteriological analyses would be made unless the disinfectants had been favorably reported on by reliable workers. In the Spring of 1910, however, at the request of another department comparative tests were made of a number of the more common coal tar disinfectants then on the Boston market.

There is, unfortunately, no standard method of testing disinfectants, one uses the "Drop" method, another the "glass rod" method, another the "silk thread" method, and still others invent new methods of their own. Then, too, the different organisms used vary tremendously in their powers of resistance and

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indeed this is also true of different strains of the same organism. So that with various combinations of good or poor methods used with organisms of high or low resistance it is possible to obtain unreliable results.

It is high time that the question of standard methods for testing disinfectants should be taken up by some representative association of bacteriologists,* that not only a standard procedure be adopted but also a standard organism chosen and kept to a given power of resistance as measured against for instance a one per cent solution of carbolic acid, then all such tests may be made on a fair basis of comparison.

It is the purpose of this paper to show not only the results of comparative tests as to the efficiency of the various disinfectants tested, but also to compare two methods of testing, viz., the "Glass rod" and the "Drop" methods. Two organisms were used, one a virulent typhoid, recently isolated, the other *Staphylococcus pyogenes aureus*, also recently isolated from a throat culture, the aureus being the more resistant of the two.

Technique of the "Glass rod" method (Hill): Sterile glass rods attached to rubber or cork stoppers are prepared in quantity and placed in test tubes. A twenty-four hour slant culture of the organism to be used is rubbed up carefully with several c. c. of sterile water. The sterile glass rods are then inoculated on the lower ends with a thin film of this liquid suspension and dried for one hour in a special box arranged with a series of holes into which the stoppers fit and which has a cheese cloth covering at one end to admit air and glass opposite to admit diffuse light.

In making the tests the rods are immersed in the desired dilution of the disinfectant for varying periods of time, after which the disinfectant is rinsed off in a tube of sterile bouillon, and the organisms which have been exposed to the action of the disinfectant are now tested by inoculating on an agar slant and this slant together with the bouillon used for rinsing placed in the incubator at 37 C. and examined daily for growth for ten days.

Technique of the "Drop" method: With this method twenty-four hour bouillon cultures of the organisms are used. The diluted disinfectants are measured out accurately in five

*[ED. NOTE —A committee on Standard Methods for the Testing of Disinfectants has been appointed by the Laboratory Section of the American Public Health Association.]

c. c. lots in sterile test-tubes and each five c. c. of diluted disinfectant receives an inoculation of 1-10 c. c. from the bouillon culture of the organism with which the test is made, disinfectant and culture being thoroughly mixed by shaking. At designated intervals, 2½, 5, 7½, 10 minutes, etc., subcultures are made from the inoculated disinfectant to 5 c. c. of sterile broth, carrying over one four millimeter loopful. These sub-cultures are incubated at 37 C. for forty-eight hours when observations are made and results recorded.

All the tests in these experiments were made with 1% dilutions of the various disinfectants and a 1% carbolic acid* was run for comparison.

"Drop" method—x stands for growth, – for no growth.

"Rod" method—‡ stands for growth, o for no growth.

T. for *B. typhosus.*

S. for *Staphylococcus pyogenes aureus.*

With the exception of carbolic acid which is placed first in the table the disinfectants are designated by number only.

* The 1% Carbolic Acid solution was made from commercial crystals by dilution, as with the other disinfectants, it being our wish to approximate as closely as possible the normal, every day use of carbolic as a disinfectant.

Time	1 Carbolic T. S.	2 T.S.	3 T.S.	4 T.S.	5 T.S.	6 T.S.	7 T.S.	8 T.S.	9 T.S.	10 T.S.	11 T.S.	12 T.S.
15″		– –		x		x		x	x	–	x	
30″		‡		–		–		x	x		–	
45″		‡						x	x			
1′		‡			x				–			x
2′		‡		‡	–					‡		–
2½′	x x	‡	x x	‡ x	‡ x	x	x x	x x	‡ x	‡	‡ x	‡ x
3½′		‡	x			x				‡		
5′	x x	‡ ‡	x x	o x	‡ x	x	x x	x x	‡ x		‡ x	o x
6′	–					x						
7½′	x	‡ ‡	x x	x	x	‡ x	x x	x	x	‡	‡ x	x
10′	x	‡ ‡	x x	x	o x	‡	x x	x x	o x	‡	o x	
12½′	‡	o ‡	x x		x	‡	x x	x x	x			
15′	‡ x	o	x x	x	x	o x	x x	x x	x	‡	–	
20′	‡ x		x x	x	x	x	x x	x x	x	‡	‡	x
25′	o x		x x	x	x	x	x x	x x	x	o x	‡	
30′	x		x x	x	x	x	– x	x x	x	x	‡	x
32′	x											
34′	–											
35′	‡		x x	x	x	x	‡ x	x x	x	x		x
40′	‡		x x			x	x	x x	x	x	‡	x
44′	‡											
45′	o		x x			x	x	x x	x	x	o	
50′			x x			x	‡ x	x x	x	x		x
60′			x x			x	‡ x	x x	x	x		x
65′			x x	x	x	x	x	x x	x	–		x
70′			x	x	x	x	‡ x	x x	x	‡		
80′			x	–	x	x	‡ x	x x	x	‡		
90′			x x	‡	x	x	† x	– x	– ‡	‡		x
100′			x			–	x	‡ x	o	‡		x
2 hr.			– x	‡	x	‡	‡ x	‡ x		‡		x
2½ hr.			‡ x	o	x	‡	o x	o x		‡		x
3 hr.			o x		x	o	x	x		‡		x
3¼ hr.					x					‡		
3½ hr.					–					‡		x
4 hr.			x		‡		x	x		‡		x
4½ hr.			x		‡		x	x		‡		–
5 hr.			x		‡		x	x		‡		‡
5½ hr.			x		‡		x	x		‡		‡
6 hr.			x		‡		x	x		o		‡
6½ hr.			x		o		x	x				‡
7 hr.			x				x	x				o
22 hr.			x				x	x				
23 hr.			x				–	x				
24 hr.		x	x				‡	x				
26 hr.			x				‡	x				
28 hr.			x					x				
30 hr.			x				‡	x				
32 hr.			‡					x				
34 hr.			o				‡	x				
36 hr.			x					x				
38 hr.			x				‡	x				
40 hr.			x				o	–				
42 hr.			x					‡				
44 hr.			–					‡				
46 hr.								o				
48 hr.												

The results are more graphically shown in the following table:

Disinfectant	Drop Method Time Required to Kill		Rod Method Time Required to Kill	
	Typhoid	Sta. P. A.	Typhoid	Sta. P. A.
Carbolic acid	6′	34′	25½′	45′
2	15″	15″	12½′	15′
3	2 hr.	44 hr.	3 hr.	34 hr.
4	30″	80′	5′	2½ hr.
5	2′	3½ hr.	10′	6½ hr.
6	30″	100′	15′	3 hr.
7	30′	23 hr.	2½ hr.	40 hr.
8	90′	40 hr.	2½ hr.	46 hr.
9	1′	90′	10′	100′
10	15″	65′	25′	6 hr.
11	30″	15′	10′	45′
12	2′	4½ hr.	5′	7 hr.

If we may be permitted to say that we arrive at a fair idea of the relative value of these disinfectants by adding together the time results of these tests then No. 2 stands first with a 28′ record. No. 11 next with 70′ 30″, Carbolic third with 4 hr. and 50′ and then following in the order named, Nos. 9, 4, 6, 10, 5, 12, 7, 3, and 8.

It will be seen that with but one exception a longer time, usually a much longer time, is required to kill the organisms with the rod method; which may be explained by saying that with this method we test not only the killing power but also the penetrating power of the disinfectant. With the drop method the individual organisms are surrounded with the disinfectant which is thus enabled to work at its greatest efficiency.

As disinfectants are used, practically, we seldom obtain such conditions as are represented by the drop method of testing, thus No. 10 seems quite superior to No. 9 as tested by the drop method but No. 9 has superior penetrating power as shown by the rod method. No. 9 would then be the better of the two for practical uses.

Many of these proprietary compounds claim efficiency far superior to carbolic acid, yet in this series of tests which we think is fairly representative, but two proved superior.

As a class they possess advantages over carbolic for cleaning purposes and as deodorants and are easier to handle. As a rule

they are much more costly. As commercial products of unknown composition we cannot be sure, except for those guaranteed by reliable manufacturers that even different samples of the same name will have equal efficiency.

In the opinion of the writers carbolic acid still holds first rank as a reliable, cheap, effective disinfectant and is to be preferred, unless for some special reason as noted above, to any of the commercial products of unknown composition.

A NEW FORM OF ANAEROBIC JAR.

By S. HENRY AYERS,
Bacteriologist, Dairy Division, U. S. Department of Agriculture.

Laboratory workers engaged in investigations on anaerobic bacteria may be interested in a new metal anaerobic jar, designed by the author, which has been used successfully in the Research Laboratories of the Dairy Division for the past year.

The complete jar is made of spun copper and consists of two parts, the jar and cover, as may be seen in the drawing.

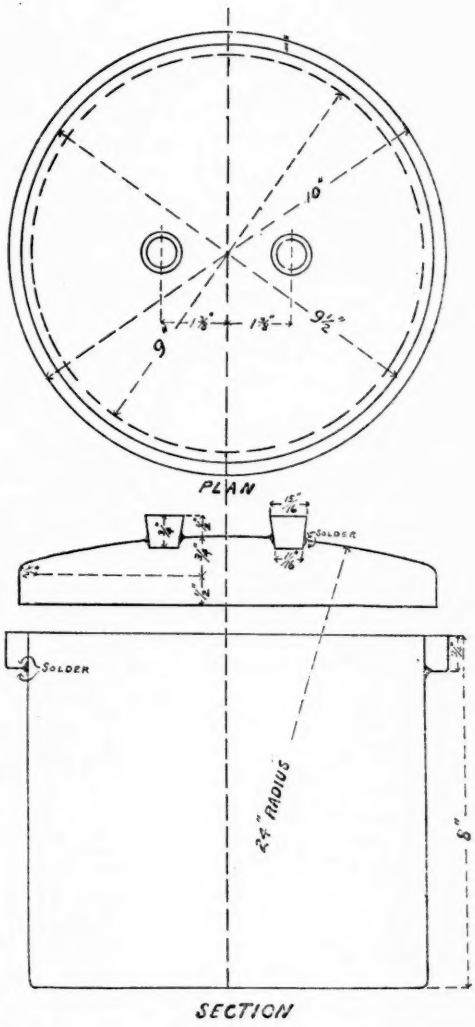
The jar is 9 in. in diameter and 8 in. high and is made of one piece of 16 oz. copper spun in the form shown in order to avoid the possibility of leaks which might occur had the bottom been soldered on. Around the top of the jar is a flange of copper ½ in. wide and ¾ in. deep. This is attached to jar by soldering both inside and outside of the flange to make a thoroughly tight joint.

The cover is 9½ in. in diameter and also made of spun copper. In the top are placed two nipples of copper each being soldered on both sides of the cover.

In using the complete jar, rubber corks should be fitted tightly through the nipples and sealed in with paraffin. Through the corks, glass stop-cocks are inserted.

When using the apparatus a crystallizing dish is placed in the bottom of the jar and covered with a perforated copper plate which forms a base on which to rest cultures. Pyrogallic acid is placed in the crystallizer and sodium hydrate added. Melted paraffin (melting point of about 60° C.) is then poured into the flange around the top of the jar and the cover with the stop-cocks closed is placed over the top so that the edges rest in the melted paraffin. The paraffin solidifies quickly and makes a tight seal which will hold indefinitely.

To open the jar it is simply necessary to open one of the glass stop-cocks to admit air, then run a flame from a bunsen burner around the flange so as to soften the paraffin. The cover may


10"
9
1⅜"
1⅜"
9½"
PLAN
SOLDER
SOLDER
24" RADIUS
8"
SECTION

then be removed easily. The sodium hydrate or hydrogen gas may be admitted through the stop-cock in the usual way after closing the jar, if desired.

The jar was made by Miller & Doing, of Brooklyn, N. Y., at a cost of $18.50. While that seems a high cost, it should be remembered that the jar is practically indestructible and has a large capacity.

It is possible for those who do not care to go to the expense of having a jar made of spun copper, to use a tin pail. A flange may be soldered around the top and a tin cover made with the two nipples soldered in it. Care should be taken to see that all the soldered joints are tight. Such a jar would be very cheap and serviceable.

The advantages of the metal anaerobic jar may be mentioned as follows:

1. Ease of operation.
2. Assurance of a tight jar.
3. Indestructibility if spun copper is used.
4. Large capacity.
5. Cheapness, if made from tin pail.

American Public Health Association

SOCIAL ECONOMICS AND PUBLIC HEALTH.*

Address by Mayor SEIDEL,
Milwaukee, Wisconsin.

"The building of a perfect body crowned by a perfect brain is at once the greatest earthly problem and the grandest hope of the race." This quotation from Dio Lewis, the noted American reformer and physician, could well stand as the motto of the American Public Health Association.

As I welcomed this, the Thirty-eighth Annual Meeting, I could not but feel that our city harbored not only one of the most noteworthy conventions, but also a convention, the moral force of which is more far-reaching than many years of prayer and preaching. Nor do I wish to be taken as being extravagant in my statements. It did not appear to me that within the reach of my voice there was present any one that came here to seek his or her own personal health. You were gathered to discuss and deliberate over the questions that pertain to the Public Health.

Who and what is this Public? Your neighbor, my neighbor. Our citizen and our fellowmen, of which thousands are strangers to each one known to us. The question: "Am I my brother's keeper," is no longer entirely an idle one.

The phrase "Public Health" is not so very old. There was a time when the health of the individual was of greater concern than the health of the public. Indeed such a phrase as "public health" was entirely unknown. How strange the following quotation sounds to us: "People who are always taking care of their health are misers, who are hoarding up a treasure which they have never spirit enough to enjoy." Yet such was the warning of Sterne, an American lawyer and contributor to reform literature.

That was the spirit of individualism. It concerned itself with the individualist alone. Today the health of the public is rapidly taking the foremost rank in the attention of men who make health a study at all. That day of individualism is on the decline.

*Read before the American Public Health Association at Milwaukee, Sept., 1910.

Great changes have come over the modern world. Where formerly production was carried on by the individual, today a great number of individuals are necessary to produce a given article. This has led to the rise of new questions, more difficult problems.

Throwing together a great number of men into one occupation led to a feeling of common suffering, common pleasure, common weeping.

Individualism placed its stamp on every institution of man, however noble its inception might pretend to be, not even excluding religion. This individualism is responsible for the spirit that breathes in such utterance as "The public be damned."

Industrial development wrought great changes. Common suffering prompted collective efforts at salvation. Not salvation to certain individuals but to each, through all. Right here it might be injected that the much maligned Labor Unions are only one expression of this new force. And they are the natural products of industrial dependence; the force or government or man is yet to be born that can destroy the spirit which with dynamic force drives the toilers together.

Even today by many the private health, or personal health of one man, woman or child is not thought of as having any connection with the vast mass of other men, women or children, except in times when epidemics or plague sweep over a community. How many in a community understand that the causes that lead to the sickness of the neighbor's child must effect their children also.

While on the one hand, this work that you are doing here for your communities can be termed as being prompted by a great moral feeling of responsibility that each one feels for the welfare of his neighbor; on the other hand, each of us only acts in the interest of self-protection.

If my brother is tubercular, syphilitic, possessed of a rank, communicable disease, then it is strictly my personal business to be my brother's keeper to the extent of watching that he cannot pass it on to me. This is one of the reasons that public sanitation, public hygiene, and social economics are commanding the attention of all earnest men and women.

Social economy is the science that concerns itself with the feeding, clothing and housing of a people or race. Given an

industrial people, its tool and implements, its intelligence and its natural resources as factors, the problem is: "In what relation to each other must these factors be placed to secure to each human individual the greatest amount of happiness commensurate with the welfare of all?"

To even the most superficial observer of conditions these facts must stand out prominently, viz.: We know that a sufficient supply of wholesome and pure food is necessary to keep a body strong and healthy; yet we permit the supply of our food to be made the object of speculation and monopoly; we allow it to be adulterated; we leave the choice and preparation to ignorance and only too frequently have not even learned to eat it properly.

We know that our lungs need an abundance of fresh, clean air; yet we live in congested city districts; our streets are littered with dirt of all kinds; we neglect our backyards and let them become fruitful hearths for the spread of disease; we neglect the grasses that act as sponges that will hold and return to the soil waste; trees and shrubs which act as shields against the chilly blasts of wind are used only to a limited extent in the building of our cities. Our men and women work in shops that very often are reeking with filth and in which only too frequently our foods are prepared; we permit the foundry cupolas and factory smoke-stacks to eject poisonous gases and soot into the atmosphere that we breathe. Sunlight which we recognize as a vital force in all life, we have shut out from our streets by means of skyscrapers. And we are not yet ready to call a halt upon the "*insanity of speculation*" in construction of office buildings. Each owner of a small lot claims license to build as high as he chooses without regard to sunlight or air.

Land speculation is responsible for miserable and frequently criminal platting. Prices of land are prohibitive and will not permit a family with moderate means to buy more than to place a few square feet of shelter upon it. And the less fortunate worker cannot even claim it.

Planning of homes is done only too often by inexperienced men, and then it so happens that the rooms that are most used can very often never be reached by the benevolent rays of the sun. Plumbing is faulty because of poor inspection or ignorance. Ventilation is entirely overlooked. If the builder is careless or

ignorant, then this only too often is true in a much greater measure of the housekeeper. Bedding which should regularly be aired in the sun, never receives an airing, though not always is the housekeeper to blame.

The high cost of clothing favors the making and marketing of shoddy garments. Improper care and improper choice of clothes, scant amount, because of high prices, accentuate the evil. Darning and mending have almost become a lost art. As a result, clothing, not at all suited to the season is worn and must be worn lest there be none at all to wear.

Men and women as well as children spend six days and more each week, ten hours and more each day in the shops where dust and fumes are breathed and no sunlight enters. The hazards are increased by death-dealing machines.

Schoolboards and Boards of Education are not free from blame. How many of your schoolgrounds are ample? How many of your schoolgrounds are provided with trees, shrubs and grass? The cat and the dog instinctively avoid a visit to your schoolgrounds, but your boy and girl are helpless. The truant that plays hooky and finds a swimming hole in a brook often displays better judgment than the learned professor.

Let me ask any practitioner whether or not the above depicted conditions have any bearing upon the success of his work. Why do these conditions exist? We are not ignorant of them. We know that they are injurious to our health. We know that they are not conducive to the growth of a strong race. And yet we tolerate them. WHY?

Because by means of their existence, we are enabled to pay higher dividends when the fiscal year of a corporation closes. IT IS ALL FOR PROFITS.

It is with these problems that Social Economy deals. It is these that the administration in Milwaukee proposes to take up one by one and solve as near as it can with the limited powers that are at its disposal.

Without the solution of these problems, many of the tasks that you will desire to take up, must prove insoluble. This is the relation of Public Health to Social Economics: To be strong and healthy, a people must have pure, wholesome, nourishing food and a sufficient supply of it. Furthermore, a people must have clean

and pure air. They must also have proper clothing and sanitary housing. They must also receive a liberal education to enable them to intelligently care for their needs.

All of these functions become the affair of all concerned. None of these functions must be left to the selfish propensity and greed of individuals or corporations. If the collective intelligence of man has enabled society to produce a sufficient amount of goods with which to supply its wants, by no law of justice or equity, should these goods be the property of any one man, or corporation to be used by him or it to exact tribute from those who have made those goods, and failing to get that tribute, starve them.

It is as wrong for one man to be the master of many in the field of industry as it is for one man to be the master of many in the field of politics.

We have stripped the monarch and nobleman of his power over his subjects. Like Americans true to the trust placed in us by Washington, Lincoln, and other great Americans who have fought, bled and died for our institutions, we must strip the trust magnate and the industrial pirate of his power over our fellow citizen.

Permit me to emphasize the fact that you gentlemen who are assembled here constitute in fact the greatest conservation congress ever gathered in America.

Land has a value. Timber has a value, and so have water power and mineral deposits. These, with machinery, are important factors in wealth production. But the most important factor of all in wealth production is human labor. Without labor of hand and labor of brain applied to raw material, there is no civilization thinkable. The greatest of all natural resources is human life with its accompaniment of labor.

It is good and excellent work to conserve land and timber and water utilities. But it is far more excellent, far more important, and far more fundamental, to conserve human life and make it more efficient and give it added ability and power to create.

The very organization of this association sprang in part from the widespread and clearly apparent waste of human life through what we now call "preventable disease." One of the best signs of the times in which we live is the coining of this phrase "preventable disease" and the increasing number of people who

recognize the portentious, noble and splendid meanings that are back of this phrase.

That our eyes must witness such fearful, stark, pitiful waste of human life through diseases that are preventable, cannot be called otherwise than a great social tragedy. But that you gentlemen have recognized that tragedy exists and that you gather to combat it, that you gather to advise with each other and use all your associated resources to fight back this tragedy and make way for a more healthy, efficient humanity, this is the brighter side of the situation.

Upon the memory of the days of my childhood, I draw for a picture. A prophet was taken by the hand and carried out and set down in the midst of a valley covered with dry bones. The prophet passed through amongst them. He observed that there were many of them strewn in the valley and there was no life to them. A voice asked: "Can these bones live?" The reply he gave was: "O, Lord, God, thou knowest." Again the voice spoke, commanding, "Prophesy," and as the prophet spoke, there was a noise and a shaking and the bones came together and sinews and flesh came upon them and skin covered them, and there was a wind and breath came over them and they lived.

When confronted with actual conditions, you may find yourself in a similar position that the prophet Ezekiel found himself in, but you must raise your voice and you must prophesy and you must teach and you must command, and soon there will be a noise, and a shaking, and men will come together and new ideas will form and new ideals will take possession of the masses and once more, they will begin to live.

THE INTERNATIONAL HYGIENE EXHIBITION, DRESDEN, 1911.

AN APPEAL.

From May to October, 1911, there will be held in Dresden, an exhibition to be known as the International Hygiene Exhibition. The scope and purpose of this exhibition are clearly set forth in the following letter presented to the American Public Health Association at its meeting in Milwaukee. The United States Government has been officially, through proper channels, invited to participate in this exhibition but up to the present time the invitation has not been accepted because of the absence of any appropriation from which the cost of representation can be defrayed. So far as is known no state government has thus far undertaken to send an exhibit. Sanitary organizations of the United States that will participate might probably be numbered on the fingers of one hand. In view of this most deplorable condition, the American Public Health Association, at its Milwaukee meeting, authorized the appointment of a committee to do whatever might be possible to bring about proper representation from the United States, that committee having been instructed to co-operate with the organization committee of the International Congress on Hygiene and Demography, which is to meet in the United States in 1912, and which, therefore, has a direct interest in seeing that the United States is properly represented at Dresden. The appointment of the committee to look after this work is, however, not sufficient, but every member of the organization should do his part to interest the United States government, through his senators and representatives in Congress, to interest his state government, and to interest any national sanitary organizations with which he may be affiliated, in preparing immediately suitable sanitary exhibits and in applying for such space as may be necessary for their accommodation. The committee named by the Association is as follows:

Prof. Henry Albert, Iowa City, Iowa; Dr. Henry G. Beyer, Washington, D. C.; Dr. E. A. Carr, Lincoln, Neb.; Dr. C. E. Ford,

Cleveland, Ohio; Dr. Allen W. Freeman, Richmond, Va.; Mr. Rudolph Hering, New York, N. Y.; Dr. Heber Jones, Memphis, Tenn.; Dr. Jos. S. Neff, Philadelphia, Pa.; Dr. M. L. Price, Baltimore, Md.; Dr. W. F. Snow, Sacramento, Cal.; Dr. Gardner T. Swarts, Providence, R. I.; Dr. Wm. Bailey, Louisville, Ky.; Dr. H. M. Bracken, St. Paul, Minn.; Prof. H. W. Conn, Middletown, Conn.; Dr. W. A. Evans, Chicago, Ill.; Dr. C. A. Harper, Madison, Wis.; Dr. John N. Hurty, Indianapolis, Ind.; Dr. Richard H. Lewis, Raleigh, N. C.; Dr. Eugene H. Porter, Albany, N. Y.; Dr. Mark Richardson, Boston, Mass.; Dr. F. W. Shumway, Lansing, Mich.

Dr. Henry G. Beyer, Medical Director, United States Navy, has been requested to see to the organization of this committee, and any further information that may be desired concerning the Exhibition, can be obtained by writing directly to him or by writing to the Secretary of the Association. Members of the Association are earnestly requested to read Dr. Beyer's letter to the Association, printed below.

WM. C. WOODWARD, Secretary.

To the President and Members of the American Public Health Association:

GENTLEMEN:—You will by this time probably all be aware of the fact that the great Exhibition of Hygiene in Dresden, 1911, is practically an accomplished fact, its success assured. While it would be superflous on my part to attempt to speak of the organization of this Exhibition, its progress and purposes, you will all admit that it is eminently fit and proper that a few words on this subject should be said at this meeting of the Association. My object in addressing you on this occasion is that of arousing your sympathetic interest in this great event.

We all realize that the prosperity of a country, the orderly progress of a nation, the maintenance of national wealth as well as health, the struggle against disease and quackery, the whole subject of the higher medical education, are all intimately connected with our efforts of raising the standard of knowledge among our people in matters concerning the public health, and Exhibitions are the acknowledged most powerful means for the diffusion of such knowledge.

The time has passed when any particular individual or concern, whether scientific or industrial, should be allowed to impose their wares upon the public by adorning them with a fictitious value and importance. The American Public Health Association should be in a position of passing upon all public health laws and regulations, before being enacted, and constitute, at the same time, the highest tribunal in the country before which all scientific matters in dispute should be brought for their final decision. We all know that public opinion is the most powerful factor to be influenced by educational means in this country. Towering over President and State Governors, over Congress and State Legislatures, public opinion stands as the source of power for good, when intelligently directed. To educate and direct that power in matters of public health is one of the most beneficent functions of the American Public Health Association.

The public must be made to feel and understand that the American Public Health Association is not a tyrannical medical trust, trying to control public interests for its own good, but an Association of the highest and purest type of scientific men, whose sole aim consists in providing every family in the country with humane and sanitary surroundings, and as having the public welfare in its keeping. The greatest obstacles in the way are private interests. So long as private interests, animated by selfishness and greed, are allowed to pervert public opinion, without educational countercurrents to correct these effects, the needed co-operation on the part of the public cannot be expected to be forthcoming. It needs the intelligent and confidence-inspiring direction of a great body, like the American Public Health Association, in all public instruction. Exhibitions are the most powerful means for the necessary knowledge and the diffusion of the principles of public health among the people.

An entirely new and uncommonly great chapter in the history of International Exhibitions opens to the world with the International Hygiene Exhibition to be held in 1911 at Dresden. In the whole history of Exhibitions, without exception, no chapter, however far reaching and important, has ever stood out with the prominence, equal to that of the Exhibition under discussion. It will indeed mark an important epoch, not alone in the history of practical and scientific sanitation, but also in that of human

culture and civilization. The Exhibition, in fact, is not so much an exhibition as it is an illustrated expression of the twentieth century civilization and culture. As a humanitarian work, the Exhibition, in the altruistic character of the motives that alone could have prompted such an undertaking, typifies the pinnacle of civilized human endeavor. One of the most fundamental features of the Exhibition is represented by the scientific section. It has become recognized that without a scientific section to correlate the different parts of an Exhibition and give each its peculiar meaning, an Exhibition would be merely an amorphous mass of apparently unrelated facts, an accumulation of fragments of knowledge without a life-giving soul. This scientific section, moreover, tends to give a universal significance to the industrial side of the Exhibition. The Exposition is intended to show what science as well as industry has accomplished in the domain of Hygiene, and in doing this it is to teach how best to translate the lessons taught by both into practical life, incidentally showing us new problems and new ways for accomplishing our ideal.

Thus, the latent lessons of scientific hygiene that have accumulated through years of patient study in laboratory work and which have remained buried between the dead covers of books on our library shelves, are at last to be opened up to the world in the form of one tremendous and monumental illustrated textbook, speaking a universal language for everybody to understand and the lessons of which everybody may take home to his own fireside for the mere price of the asking. This most generous undertaking has its origin in the fertile minds of a small group of German scientists, who met at Dresden in 1903. The small local Exhibition on sanitary subjects in that year, which was the object of this gathering, met with a public reception so enthusiastic that the time seemed, to this small circle of men, to be ripe for a similar but larger Exhibition and in which the whole world might be invited to participate and receive its due share of the benefits it conveyed. The conception then and there formed and discussed developed as years went by until at last it has assumed the gigantic proportions, promised and presented to us in the completed and published programs of today.

In planning for this Exhibition, the fundamental idea consistently carried out was this: That the center of gravity of an

Exhibition lies in the domain of ocular demonstration and not in that of considering the scientific problems involved in sanitation, which is the function of congresses. To judge from the list of names of noted hygienists, registered as active participants in this great enterprise, the most noted men in the world seem to have fallen into line, and this active interest is by no means confined to Germany alone, but every country of Europe, Asia, and Africa seems to be creditably represented, so that the success will be a monumental one. Most every city in the German empire has contributed to the financial success of the undertaking, the most loving and beloved of Kings, Friedrich August, of Saxony, being its protector, the German Emperor, himself supporting it, and up to today 2500 scientific men are devoting their time and energy to this cause without apparently receiving any pecuniary returns for their services. The question for us to answer is:

CAN THE UNITED STATES AFFORD TO KEEP OUT OF IT?

So far as I know, no organized effort has been made in this country up to the present time for participation in this Exhibition. All invitations for united action have fallen by the wayside and even the United States Government has only half heartedly declared its intention to participate. When even so small a country as Bulgaria has appropriated 200,000 marks in order to be represented at this Exhibition, when Japan has appropriated 300,000 marks for the same purpose and intends to send a war ship to Germany with orders to stay during the entire Exhibition, is it right, is it proper, is it even policy for us to keep out of it?

Can we, indeed, as a great nation, afford to decline, accepting an invitation by a friendly government to join friendly nations in an amicable rivalry in such a humanitarian endeavor as this? Is it in keeping with national dignity and can it be done without loss of prestige and of the esteem of the civilized world, or would it be more in keeping with our reputation as a generous nation and in harmony with the public will for us as a Government, and as private citizens as well, to take our place in the procession of nations that belongs to us in one of the greatest humanitarian endeavors ever before undertaken? When this great International Manual on Applied Hygiene will be opened to the world in 1911 at Dresden, in which the great contributions of the world will

stand recorded and, when the representatives of every nation and country will point with pride to their countries' contributions, while the United States can only point to a blank page in the book, would not the face of every American, whether patriotic or not, show the humiliating blush of shame? The impression which such a sin of omission on the part of the United States would create might be disagreeably enduring, especially on the part of those on whose shoulders the responsibility in matters of this character rests. Let us all therefore, as members of this Association wake up to a realization of our share of duty in relation to this matter and organize and set to work. Above all, let us select a leader with the necessary organizing capacity and enough of moral force to overcome the difficulties inseparable from the participation in all International Exhibitions. Let us select a man, who sees in such obstacles and difficulties, his opportunities. As long as we have in this country no such thing as a National Department of Public Health to take the lead in all such matters, the conditions would point directly to the American Public Health Association, upon which the duty of taking the lead in this matter devolves and in keeping with this conception, an appeal to this great Association is herewith publicly recorded. Will it accept the challenge and answer to the charge?

Mr. Emil A. Lingner, the Imperial German Commissioner, a gentleman of the right sort, with an impressive and most agreeable personality, of a confidence-inspiring honesty and frankness, and deeply impressed with the importance of his duty, and who came to this country in order to ascertain what was the real cause of the seeming indifference toward this Exhibition and for which this country had been unduly conspicuous, should not be allowed to have his efforts go unrewarded.

HENRY G. BEYER,
Medical Inspector, U. S. N.,
In Command, U. S. Naval Medical School, Washington, D. C.

September 2, 1910.

The Massachusetts Association of Boards of Health

OCTOBER QUARTERLY MEETING

Boston, Massachusetts

The regular quarterly meeting of the Massachusetts Association of Boards of Health was held at Boston, October 27, 1910, under the Presidency of Dr. Henry P. Walcott.

Upon the recommendation of the Executive Committee the following gentlemen were elected members of the Association:

Ernest B. Dane, of Brookline.

Dr. James J. Scannell, of the Laboratory of the Boston Board of Health.

Dr. Benoni M. Latham of Mansfield.

Dr. P. Challis Bartlett, Superintendent State Sanitorium, Rutland.

Dr. Merrill Edwin Champion, of Arlington.

Dr. Thomas E. Lilly, of the Shirley Board of Health.

Dr. Rufus E. Darrah, Chairman of the Newport, R. I., Board of Health.

Dr. Charles F. Whitney, of the Boston Board of Health.

Dr. Charles E. Harris, of the Barnstable Board of Health.

REPORT OF THE COMMITTEE ON TYPHOID FEVER.

A belief that American sanitary officials are not at present doing nearly as much as they should to prevent the spread of typhoid fever was the motive which lead to the appointment of this committee. Even the departments of health in our largest and best governed cities are far from exercising the control which they could, and in smaller communities, with less means, active preventive measures against the disease are often sadly neglected. The committee therefore feel that it is their duty to urge in the most emphatic way, certain definite measures which the local boards of health ought to recognize as incumbent upon them to carry out. It was even suggested that legislation might be desirable, which would give to the state board of health authority to compel local health officers to carry out the necessary preventive measures. But it is earnestly hoped that the sanitary officials of our cities and towns will awake to a realization of their duties and of the good results which are likely to follow more energetic preventive measures, so that such centralization of sanitary administration will never be considered necessary.

The discussion of this subject at the last meeting related to the extension of typhoid fever by contact infection, or by the direct contamination of food materials by the hands of patients or carriers. The committee have therefore restricted their recommendations to measures intended to prevent this mode of disease extension. The importance of the distribution of typhoid fever by means of sewage pollution of water was not lost sight of, but the work of the Massachusetts state board of health has, at least in this commonwealth, pretty well educated the public to realize the necessity for correct water and sewer engineering. Indeed the larger communities of the commonwealth are well protected against water-borne epidemics. Engineers have been wont to call non-epidemic, non-water-borne typhoid fever, which occurs with even the purest water supply, as "residual typhoid." We now know that this "residual typhoid," which has been too long neglected, is due chiefly to fairly direct modes of contact infection.

It is therefore necessary to bend our energies to the eradication of this type of the disease, and to do so successfully, we must realize that it it as truly a contagious disease as is diphtheria or scarlet fever, though not to the same degree.

The first requisite for a successful campaign against a contagious disease is the prompt report of cases. One reason why physicians fail to report typhoid fever is because they do not see any results. The report is too often merely placed on file. If the case is promptly visited, water, milk and food investigated, and specific directions given as to disinfection and the protection of the rest of the family and the public, physicians will realize that their reports are of some consequence, and have it in mind to make them promptly. Failure and delay in notification, in a large proportion of cases, is due to failure or delay in making a diagnosis. Hence the health department, local where possible, state where the local fails, should provide not only for the Widal test, but what is much more important, for cultures from blood and excreta. Furthermore every facility must be given the physician for sending in the material, and prompt notice of results must be sent to him. The case should then be visited at the earliest moment by an agent of the health office, a medical man or a visiting nurse, or both. The epidemiological history of the case should be obtained, and not general advice given, but specific directions as to disinfection of the excreta and clothing, and as to what must be done by the nurse to avoid infecting herself and carrying the infection to others. The patient should be isolated in much the same way in which diphtheria patients are isolated. The majority of the committee believe that the best way to secure such isolation is to placard the house, both front and rear, the rear placard, usually the one seen by milkmen and grocers, being the most important. In the families of the poor, where there must be great danger of the infection of other members of the family, removal to a hospital is desirable where possible. If any member of the family is a food handler, it must be seen to, that there is no chance for the spread of the disease by this means. Circulars of information may be left with the family but these should never take the place of direct personal instruction.

If typhoid fever cases are to be isolated, a criterion must be established for the termination of isolation. With the inadequate

laboratory facilities now available, it is impracticable at present to require bacteriological tests for all cases. It is believed, however, that such tests should be demanded for handlers of food. For others a good working rule would seem to be to terminate isolation when the temperature of the patient has been normal for two weeks. It has been shown that by this time the large majority of cases no longer excrete the bacilli. It is not believed at present to be feasible to control chronic carriers unless they are food handlers. If they are food handlers they ought to be restrained from pursuing their usual vocations and the health department should keep itself informed as to their where-abouts and their business. In order to prevent the development of carriers and to eliminate the danger period after convalescence, it would seem proper for local health officials to urge the administration throughout the course of the disease of urotropine, otherwise known as hexamethylen-tetramine.

Dr. Richardson says: "Approximately 25 percent of all typhoid cases show, especially in the later stages of the disease, the presence of the typhoid bacillus in the urine, and the specific germs may persist in the urine for months or even years. For the elimination of this danger, I recommended in 1898 the use of hexamethylen-tetramine under the name of urotropine, and the favorable results obtained by me have in general been confirmed by a great many other observers in other parts of the world. As in many other fields, however, prevention is much more easily brought about than a cure. That is to say, if there is present more than a simple bacilluria and if a true inflamatory process has been set up in the urinary passages, then the result of medication is much less successful and uniform. Where, however, the question is one of the simple presence of the bacillus in the urine, the results following the administration of hexamethylen-tetramine are almost theatrical. I have seen, for instance, a urine absolutely cloudy with typhoid bacilli become absolutely clear within forty-eight hours. In my opinion, therefore, hexamethylen-tetramine should be given as a urinary prophylactic in all cases of typhoid fever, and should be continued for at least two weeks into convalescence. A proper dose would be 5 grains three times a day, although in cases where actual inflamation exists larger doses can be given, even up to 15 grains every four hours.

In rare instances the use of this drug may be followed by painful micturition and haematuria. In such cases, of course, the drug must be omitted. There is no record of any permanent injury having been done by the drug.

There are a number of proprietary names for this drug, among which are urotropine, cystogen, aminiform and formin.

It is possible, furthermore, that the drug may be of value in restricting the number of typhoid carriers. Crowe has found that the drug is eliminated in the cerebro-spinal fluid and also in the bile. For this reason it is very possible that typhoid carriers who, in many instances at least, suffer from a chronic infection of the gall bladder, may be very materially reduced in number."

Besides the preceding suggestions which have to do directly with the personal sanitation of the patient, there are certain measures relating to municipal sanitation which are of importance in the prevention of typhoid fever. So far as the environment is concerned, the most important factor in the spread of typhoid fever is the privy vault. In it are stored the bacilli of the disease, and from it they may be distributed by flies, by the hands, and in badly constructed ones, by rats, dogs, cats, hens, etc. Moreover the privy is itself a breeding place of flies, and its mere presence on the premises encourages untidiness and the careless deposit of slops and excreta on the ground. Abundant evidence from all over the world shows that the removal of privy vaults causes a notable decrease in the prevalence of typhoid fever. Where there are no sewers privy vaults are often necessary, and it should be the duty of boards of health, a duty which is sadly neglected, to see that privy vaults are tight, covered and fly proof, and that the privy building is tight and sufficiently screened. Builders and contractors' privies should be looked after even more carefully than are house privies. Rules and regulations in regard to the committing of nuisances ought to be rigidly and continuously enforced by boards of health.

In order to more clearly bring these matters to the attention of boards of health the committee makes the following

RECOMMENDATIONS.

1. Local boards of health should make every possible effort to secure the prompt reporting of all cases of typhoid fever.

II. The State Board of Health should provide for the physicians and health officers of the Commonwealth, bacteriological examinations of blood, urine and feces for the presence of typhoid bacilli; it is also recommended that the local board of health laboratories take up this work as soon as practicable.

III. It should be the duty of every board of health to send a trained agent to the household from which a case of typhoid fever is reported, within 48 hours, for the purpose of seeing that the case is properly isolated, and the stools and urine effectively disinfected.

The Committee recommends that the stools and urine be disinfected with milk of lime, (one part freshly slaked lime to eight parts of water,) or chlorinated lime (6%), or carbolic acid (5%), or formalin (10%), or by boiling in soda solution. The discharges should be received in a vessel containing some of the germicidal solution, and more should be added so as to cover the mass and be equal to at least twice the volume of the material to be disinfected. The entire contents of the vessel should then be thoroughly stirred, special care being taken to disintergrate lumps. The vessel should be covered and allowed to stand no less than one hour before the contents are discarded.

The disinfectant should be furnished free of charge at the direction of the health officer.

IV. Local boards of health should investigate the source of infection, especially the milk and water supply, of every case of typhoid fever reported, and should send a copy of the report of such investigation to the state board of health.

V. Every house in which there is a case of typhoid fever should be placarded.

VI. All cases of typhoid fever should be isolated.

VII. All cases of typhoid fever should be given hexamethylen-tetramine throughout the disease, and for two weeks after the temperature becomes normal.

VIII. Isolation may ordinarily be terminated when the temperature has continued normal for two weeks, as certified by the attending physician. But patients who in their occupation are likely to infect food, should not be released until four consecutive negative cultures from stools and urine have been obtained.

IX. Bacilli carriers should under no circumstances be allowed to engage in occupations which necessitate the handling of food; for example, carriers should not be employed as cooks, or waitresses, or in any part of the dairy industry.

X. All carriers should be under the closest supervision of the local health authorities, and in case a carrier moves to another community, the health authorities of that community should be notified.

XI. It should be the duty of the local boards of health having cognizance of a case of typhoid fever on a dairy farm, in addition to other measures, to notify promptly the boards of health of the communities to which the milk from that farm is shipped.

XII. Wherever there is a public sewer, local boards of health should cause the prompt removal of all privy vaults, and where privy vaults are necessary, the board of health should cause them to be properly constructed.

XIII. Boards of health should institute active measures for fly suppression.

Dr. Charles V. Chapin, Chairman,
Dr. D. D. Brough,
Dr. Nelson C. Davis,
Dr. Mark W. Richardson,
Dr. M. J. Rosenau,
Dr. G. L. Tobey,
Dr. F. P. Denny, Secretary.

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* On motion of Dr. Chapin, Dr. Rosenau and Dr. Richardson were added to this Committee, having previously served unofficially.

DISCUSSION

Dr. DURGIN. I move that the report be accepted and adopted.

Dr. DENNY. It has been a comparatively simple matter for the committee to draw up these recommendations, for it has been known for a long time what precautions ought to be taken in typhoid fever. The real problem is to get these recommendations carried out. The infection extends so far beyond the limits of the town in which a case occurs that typhoid fever is not of mere local concern, and it is a question whether the precautions that are to be taken should be left to local option. The citizens of Massachusetts have a right to insist that certain precautions shall be taken in every case of typhoid fever. They should at least insist that every case be visited by a health official for the purpose of giving instructions and seeing that the proper precautions are taken. Now, how can we get even this done? It is probable that some boards of health may be stimulated by this report to increase their efforts, but if this subject is left with the mere publication of these recommendations it will be years before any adequate precautions are taken in Massachusetts to prevent typhoid fever. It has been proved in certain localities in Germany that the energetic application of these principles is sufficient practically to stamp out typhoid fever, and the only problem for us to consider is how we can get these things done here. As stated in the report, the committee considered the question of legislation as a means of securing more uniform and effective work on the part of the local boards of health, but there was a feeling that that would not be a popular measure. On the other hand, it may be said that many of the duties of local boards of health are at present prescribed by law. If you peruse the manual of the public health laws you will see that few if any of these prescribed duties of boards of health concern the health of the citizens of the state as a whole as much as would regulations in regard to typhoid fever. Of course we don't want any laws unless they are necessary, but it is necessary that the health of the people should be protected and that the present useless sacrifice of human life should be prevented; if this cannot be accomplished in any other way, then we must have legislation.

Prof. SEDGWICK. I should like to make an amendment to Dr. Durgin's excellent motion, in this form: namely, that the report of the committee be accepted and adopted, but that the committee be continued and requested to confer with the State Board of Health as to the best methods of making this report effective, the committee to report at a future meeting of the Association; and in support of that amendment I would like to say just a word. It has given me the keenest possible pleasure to listen to this clear-cut, scientific, definite report of the committee. We have now reached the point, as a body, which Dr. William Budd, one of the finest ornaments of the medical profession, reached forty years ago, and it is now our duty, it is especially the duty of the local boards of health, to put into effect the wise recommendations, the absolutely scientific recommendations, of this committee. The kernel of the whole matter, as I see it, is the recognition of typhoid fever as a contagious disease. Once that recognition becomes general, once its corollaries are appreciated, there need be no further difficulty. It then becomes the bounden duty of local boards of health to treat typhoid fever not in a vague kind of way as if it were a remotely contagious disease, but vigorously and as if it were an actively contagious disease, not as contagious as some others to be sure, but enough so to make it a great menace to the public health. And with these reflections, I would like to renew my motion for amendment.

Dr. PALMER. I would like to second that amendment, and I would like to say a word about it. A few years ago, when I had the honor to go about the State as representative of the State Board, I was amazed at what I found as to the constitution of the ordinary country board of health. These rules would apply particularly to the cities, where they have good boards of health, especially those represented by medical men; but I found in my travels in the different cities and towns that many boards of health have no medical men upon them, and if there is a medical man he is a political medical man, put there as a reward for some service, and the most that he does is to collect his fee from the town at the end of the year for the honor. I think no efficient legislation or regulation will be established until we have some improved method for the appointment of health officers in our

smaller cities and larger towns, and I have an idea as to how that can be done. We have under recent legislation state health inspectors by districts. Those men are well versed in the standing of the boards of health in the respective towns and cities over which they have an oversight. I think it would be a very easy matter for those men to recommend to some central authority, like the State Board of Health, men who will take an interest and be efficient in carrying out health duties. If some such scheme as that, improved upon if you will, could be carried out, I think we would see better effects from the report.

The PRESIDENT. Dr. Durgin accepts the amendment offered by Professor Sedgwick, and the motion now before you is that the recommendations of your committee be adopted, and that your committee be requested to confer with the State Board of Health and to report the results of that conference to a subsequent meeting of this Association.

(The motion was adopted by unanimous vote.)

Dr. JAMES B. FIELD. At a meeting of the Executive Committee it was voted to recommend that our annual dues without JOURNAL be fixed at $1; including a subscription to the JOURNAL $2.

(On motion of Dr. Field the recommendation was unanimously adopted.)

CHOLERA.*

By Prof. MILTON J. ROSENAU,
Boston, Mass.

Cholera has a way of its own, all its own. Like other things that are oriental, it is peculiar. It smoulders for years in certain parts of the world and then breaks loose from its confines, marches along the lines of trade and travel, and threatens to become pandemic. This has happened in the history of cholera a number of times, and as far as we are able to see we are at present confronted with such a pandemic. While we understand the cause of cholera pretty well, and realize its mode of spread, we do not know why it acts in this particular way. It is just like a spark in the forest or a smouldering fire in the underbrush, it may remain quiescent for some time, only burning as a little local fire, or it may threaten a great conflagration, or the wind, or the dryness, or the amount of vegetation, and the other factors, may favor the blowing of the sparks to distant parts, where secondary fires or secondary conflagrations are caused. That is very much the way that cholera acts. Of course we have certain guesses why cholera acts this way, and if there is time I should like very much later to refer to some of them.

I think it is very interesting to compare the spread of cholera that has occurred within the year with the last pandemic outbreak that has occurred within our memory, that is, in 1892, when the great epidemic occurred in Hamburg, in which time there were about 20,000 cases and almost 10,000 deaths. When cholera started from the Orient and came to Europe in 1892 and threatened this shore, the newspapers were hysterical. The pressure was so strong upon the President, that he forthwith ordered an absolute quarantine of twenty days upon all immigrants arriving in our country, and other measures that were extravagant, far beyond the needs of the case, were put into operation. I think those who understood cholera, as much as was under-

*From stenographic notes of extemporaneous remarks made at the meeting of the Massachusetts Asso. of Boards of Health, Oct. 27, 1910.

stood about it at that time, felt sorry that this extreme was resorted to, but we were in the hands of our friends: the public demanded that much be done. At that time I was a member of the Marine Hospital service, and received hurry telegraphic orders to proceed to one of our seaports for quarantine duty to carry out this order of the President and the extra regulations that were hurriedly made under more pressure. I remember distinctly at that time a few cases of cholera that occurred in New York at that time, and one of the newspapers had a sensational article of a suspected case of cholera that was said to have occurred in Chicago, and that some persons in Milwaukee, frightened by this report, cut the telephone wire for fear that in talking over the wire the infection might be carried from Chicago to Milwaukee.

Now it is a great comfort, and I think it is a very good sign of the progress that is being made in sanitary science, (the REAL progress that is being made), to contrast the conditions in 1892 with what is going on at present. The situation now is taken calmly. Efficient measures have been planned and are being carried out without unnecessary fuss. I think there is greater confidence in those who administer the quarantine and the public health measures, not only in connection with cholera, but with our other diseases, and I think above all that the people at large, through the education which has been gradually going on, have a greater confidence in the sanitary sciences themselves, so that when sanitarians state to the public that there is no danger, or very little danger, they accept that at its true face value and are willing to abide by it. That to me, as a natural born optimist, is one of the most favorable signs of the real progress that has been made during this brief span of less than a generation.

In 1892, as pointed out in a recent editorial in the "Journal of the American Medical Association," a sanitarian called attention to the fact that if cholera should get into this country it would seriously threaten large water-borne epidemics in such cities as Philadelphia, Chicago, Lawrence, Lowell and Albany, as all of those cities at that time drank a polluted water, carrying typhoid and other intestinal infections. Since then, the particular cities that were singled out have all improved their water supplies very much, either through sand filtration or otherwise, so that a

serious water-borne epidemic of cholera would be practically impossible. We still have rather large communities in this country, situated along the course of our interstate rivers, drinking raw water that may possibly become infected, but I should think for the most part that we are reasonably protected against any such water-borne calamity as visited Hamburg in 1892.

Without going into details, it is perfectly evident to anyone who has ever seen cholera that it is one of the easiest diseases of all to recognize. It does not require a trained physician; anyone who has once seen a case of cholera will know it when he sees it again. The trouble, of course, comes with the mild cases, the so-called missed-cases, and the carriers.

Fortunately, bacillus-carrying is not as frequent in cholera as it is in typhoid. In typhoid from two to four per cent of all persons who recover from that disease continue to shed the bacilli and thus become chronic bacillus carriers. We do not know the exact percentage in cholera, sufficient data not having been accumulated upon that subject, but from all the work that has been done we do know that within a few days, usually four days after symptoms have ceased, the specific organism disappears from the discharges. We also know definitely that people in perfectly good health, corresponding in all respects to the typhoid carriers, may shed the cholera organism, so that the danger, while less, nevertheless exists.

The bacterial diagnosis of cholera is based almost entirely upon its biological characteristics; that is, it must agglutinate with the specific serum and it must produce Pfeiffer's phenomena. It does not make any difference whether the organism is curved, like the classic vibrion that Koch described, or whether it is straight, whether it is round or whether it is spiral; if it will agglutinate with a serum in the ratio of one to a thousand it is considered to be the specific cause of cholera.

The details of the modern methods of diagnosing cholera in the laboratory I will not go into, but they have changed considerably since those that Koch first described.

As far as the methods of spread are concerned, at one time we looked upon cholera very much as we regarded typhoid, that is, as being a water-borne disease almost purely and simply. Perhaps this view in regard to cholera was accentuated by the original

experiments of Koch made in Alexandria, where he actually isolated the comma bacillus from the well from which the persons who were attacked with the disease drew their drinking water supply, corresponding very much to the classic case of the Broad Street well in London over fifty years ago responsible for the first well recognized water-borne spread of cholera. It is perfectly true that in some definite instances, such as those mentioned at Hamburg, etc., water has been and probably will again be the vehicle through which the specific cause of cholera is spread, but for the most part in cholera, just as in typhoid fever, more cases are spread through what is known as contact, through fingers, food, flies, etc., than through water. This was proven absolutely in the Philippines.

The history of cholera in the Philippines since the American occupation is particularly instructive in that regard as well as in certain others. Cholera in the Philippines smouldered and practically disappeared as far as any cases could be found clinically, and a careful search by bacteriologists in Manila connected with the Bureau of Science failed to find carriers. What they did find were persons shedding comma shaped organisms that resembled cholera but failed to give all the reactions that we recognize in the true cholera germ. All of a sudden, without rhyme or reason, a case or two of clinical cholera would appear, perhaps, in the city of Manila, and again in these cases, while clinically characteristic, the *typical* cholera vibrio could not be detected. However, in the next case, or perhaps in the third generation, that is, the third successive group of cases, the true typical organism could be isolated, and then there would be an explosion, cases cropping up, here and there all over the city. This would occur in and spread to different parts of the island. Sometimes the same thing would occur simultaneously in different parts of the island or in different islands of the Philippine group, and then gradually subside. This history has repeated itself there in several instances since the American occupation.

Careful studies showed that the people who were attacked certainly could not have been infected from a common water supply, and that for the most part the water which they drank was probably not the medium of conveying the disease, but that they received the infection in some other way. The disease, therefore, was

fought entirely along the lines of contact infection. It marched through one of those large islands just as it was spread across this continent by the miners in 1849 seeking their fortunes in California. During the cholera outbreak in the Phillipines a sanitary guard was placed at a narrow neck of land towards which cholera was traveling, and through the usual processes of isolation, disinfection, and detention where necessary, it was stopped absolutely at that point, just like the old story of Horatius at the bridge, showing that cholera can be stopped independent of the old notion that we used to have that it was almost entirely a water-borne disease.

That is exactly the way cholera is attacked at maritime quarantine, and that is exactly the way that cholera will be kept out; or at least the attempt is being made, and doubtless will be successful, to keep cholera out of this country. The plan of campaign consists first of all in detaining all immigrants who come from cholera districts, whether Russia or Italy, for five days under observation at the port of departure. If these five days have passed uneventfully, five days covering the period of incubation in the great majority of cases), they are then permitted to embark, however again being carefully examined at the time of embarkation. They are under the eye of the surgeon during the voyage, and upon arrival both the master and the surgeon of the vessel must certify under oath that no case of diarrhoeal disease has occurred on the voyage. At the port of arrival, we will say Boston, they again meet another barrier, where the quarantine officer again carefully examines all the personnel on board the vessel for cases or suspected cases, and finally, if everything is all right and they are permitted to land, the commissioner of immigration, through a plan that has been promulgated from Washington through the public health and marine hospital service, requires the commissioner of immigration to send the names of these immigrants through the state boards of health to the state to which these people are going, so that each state may keep track of these various immigrants. If anything happens, the health authorities are thus in possession of important information and are able to take proper measures so as to nip any growing infection in the bud. It is perfectly obvious that with all this we have a carefully planned and well executed chain of protection. We

might call it, a first, second, third and fourth line of defence, all in charge of capable and efficient and wide-awake officials; our country is well protected against an invasion of cholera, and further, we can have every confidence that even if a case should come in as a mild or unrecognized case, or a carrier, with our improved, though still imperfect, sanitation, we would not have any serious trouble from it.

Dr. C. V. CHAPIN. I would like to ask Dr. Rosenau what he thinks should be the duty of a local health officer who receives a list of names from the commissioner of immigration at the present time. Should he simply place that on file, or should he deem it his duty to hunt them up and keep them under observation, and if so, for how long?

Professor ROSENAU. It would be hard to formulate what should be done under all conditions, but as a health officer I should feel very much inclined to keep as close watch over those people and the neighborhood into which they go as the facilities at hand would permit, and if possible to send a trained agent at least say twice a week to those places, to visit those particular people, to keep track of them in that way for a period of say three weeks or a month. The ideal way is to require these people to report to the health officer every day for a specific period; if they do not come to take it for granted that they are sick with cholera and then to look them up.

INFANTILE PARALYSIS.*

By R. W. LOVETT, M. D.,
Boston, Mass.

The increased frequency of infantile paralysis in this country and in Europe in the last few years has attracted the attention of the medical world here and abroad, and much has been written on the subject. Certain matters are of interest and possibly of importance as bearing on the present situation.

I shall first deal with the general aspect of the question, and second with the disease as it has appeared in Massachusetts in the last four years.

That the disease has increased in frequency in various parts of the world is a matter of common observation, nor can this increased frequency be accounted for by the fact that the disease has of late attracted much more attention and that more cases have been reported. In the five years ending in 1904 there were reported from all over the world some 350 cases of epidemic infantile paralysis. In the following five years—the five years ending in 1909—there were reported from all over the world over 8,000 cases of epidemic infantile paralysis. This increase you will, I think, agree is too great to be accounted for by any increased observation on the part of the profession. Again, we may trust our own observation to a certain extent, and such epidemics as have this summer occurred in Springfield and Fall River did not take place and escape observation ten years ago.

The records at the Children's Hospital contribute a point of interest. For the last twenty-five years cases of infantile paralysis have been coming to the Outerpedic Department from all over New England, and the number of them continued more or less steady, increasing as the clinic increased up to 1907, when a very sharp increase in the cases occurred, appearing in the chart as a line almost vertical, about five times the usual number of cases occurring in that year. Since then it has dropped, but not to the level of former years.

Read before the Massachusetts Association of Boards of Health, Oct. 27, 1910.

Of these 8,000 or more cases reported in the five-year period ending in 1909, five-sevenths of the total number were reported from the United States. It therefore seems to me pertinent at the present time to inquire if in the United States we can find any general factor which would have any bearing upon this very great and very serious increase. Ten years ago epidemic cases were reported by tens, whereas now they are reported by hundreds. The history of the large epidemics is as follows: The first really large epidemic occurred in Norway and Sweden in 1905, there being about 1,000 cases in Norway and 1,000 cases in Sweden. In 1907 an epidemic of about 2,500 cases occurred in New York, and in 1909 there were 1,000 cases in Massachusetts, and about 1,000 cases divided between Minnesota and Nebraska. In addition to this a fairly large number of smaller epidemics were reported from various parts of the country, including one of 140 cases in Cuba, where the disease had never previously appeared.

As far back as 1894 there was an epidemic of 136 cases in Rutland, Vt., and two other epidemics at least were reported from Massachusetts a number of years ago, one in North Adams and one in Gloucester, but no generalization of the disease followed. It is evident, therefore, that there is some condition now existing in the community which favors the spread of this disease which did not exist in 1894, when the Rutland epidemic occurred. I have therefore analyzed a few factors which it seems to me are of possible importance in this connection, and to which I would invite your attention.

It has been suggested that the New York epidemic of 1907 was brought here from Sweden, which brings up the whole question of immigration. A sharp increase in the number of immigrants coming to this country occurred between 1904 and 1907, the number rising from 800,000 in 1904 to something over 1,000,000 in 1905, 1906 and 1907, after which it dropped. There was therefore a large increase in our foreign population between 1904 and 1907, most of which passed through New York. Particular attention is to be paid to the Scandinavian immigration, because Norway and Sweden have been the chief seats of the disease in Europe up to a recent time. In 1905, 1906 and 1907 the Scandinavian immigration fell off decidedly from the figures of the preceding three years, and in 1907—the year of the New

York epidemic—there were 42,700 Scandinavian immigrants, a smaller number than had occurred since 1901, and since 1907 the Scandinavian emigration has dropped still further. So far then as the influence of immigration goes there was a decided increase of total immigration just prior to 1907, but a sharp falling off in the number of Scandinavian immigrants in the same period.

Of other general factors of possible importance in the spread of the disease, the next to be investigated was the question of passenger traffic in the United States, as to whether there has been a very marked increase in the number of people travelling in the last few years. In 1904 there were 715,400,000 passengers carried by the railroads, and in 1908 there were 890,000,000, the average number of passengers per train mile being in the first period 46, and in the second 54. This of course points to a decided increase in the railroad passenger traffic in the last five years.

The only available figures with regard to electric railway traffic are those of 1902 and 1907. In 1902 the number of passengers carried was 5,836,000,000, and in 1907 it was 9,500,000,000, an increase of about 4,000,000,000 people travelling on electric railways over the number five years before.

These two sets of figures certainly point to a greatly increased freedom of passenger travel, and as it has been shown repeatedly that the disease follows the lines of traffic in its spread, this fact is probably of importance.

Another factor with regard to travel is to be found in the increasing use of the automobile, and here the only figures which I have been able to analyze are those relating to Massachusetts. In 1905 there were 4,800 automobiles registered in Massachusetts. and in 1909 there were 24,000, that is, between 1905 and 1909 the number of automobiles in this state—which is probably typical of the condition in the country—increased five times. As the disease is not one confined to the lower classes this increased facility of traveling may be a factor.

The disease is one that occurs in the summer, and affects principally children. In consequence of this seasonal occurrence, which is practically a universal rule, there are three factors belonging to summer which are worthy of investigation as possible sources of infection. These are fruit, dust and insects. The

high cost of living has undoubtedly led to a diminished consumption of meat and presumably to an increased consumption of fruit. I therefore investigated what figures were available with regard to the traffic in fruit from the report of the Interstate Commerce Commission. This traffic has increased steadily between 1900 and 1908, the increase being from 1,000,000 to 2,000,000 tons a year, but there has been no sharp increase since 1904, the only sharp rise occurring between 1904 and 1905. Since 1905 it has been almost stationary. So far as these figures go, therefore, it would not seem as if there were any very noteworthy factor to be found in this analysis, although common observation would seem to point to the fact that in this community at least there are more fruit stores and apparently more fruit is in use than was the case five years ago.

Coming next to the question of dust, the rainfall of the country has been analyzed for two periods, first, the period of five years from 1900 to 1905, and second, the following five-year period from 1905 to 1910. The total rainfall of the last five years on the Atlantic seaboard has shown everywhere a diminution, reaching a high figure in New England. On the contrary, the regions in the Northwest affected by the epidemic of infantile paralysis in 1909 show an increased rainfall in the last five years, being as much in excess of the normal as New England was deficient. In the Middle Atlantic States, including New York, the rainfall in the two periods was practically the same. Excessive dryness in the last five-year period can therefore not be put down as a condition pertaining in affected regions, if one takes New England with Nebraska, Minnesota and New York.

The question of the prevalence of insects in its relation to the spread of the disease presents many difficulties. Although the height of the disease corresponds to the prevalence of flies as observed in some localities, in other localities it does not correspond to this increased prevalence, in some cases the maximum prevalence of flies having been noticed toward the end of June and in other cases toward the end of August. The question of insects must receive very much more extended and more careful consideration before any trustworthy conclusions can be drawn.

Summing up, then, the conclusions so far as they have been mentioned with regard to the country at large, there is no question

but that there is a very great increase in passenger traffic on railroads, electric cars and automobiles; that foreign immigration showed a sharp increase just preceding the prevalence of the disease in the United States; and that investigations as to fruit and dust give no noteworthy information.

Taking next the occurrence of the disease in Massachusetts in the last four years, there are certain facts which are of interest and possibly of significance. If the epidemic of 1909 in Massachusetts came from the epidemic of 1907 in New York it was after a two-year interval, and if the epidemic of 1907 in New York came from the epidemic of 1905 in Sweden, and if the 1909 Cuban epidemic originated from the 1907 New York epidemic two years also elapsed here, it also was after a two-year interval. This fact may or may not have some bearing on the question.

In Massachusetts in 1907 we had 234 cases. The disease was distributed through the state with no epidemic centers of importance, and the distribution of the disease corresponded roughly to the distribution of the population. In 1908 we had 136 cases, half of which occurred in an epidemic in Franklin County in the upper Connecticut Valley. In 1909 we had 923 cases, the epidemic center being in Boston and the neighborhood. In 1910, up to October 15th there have been reported 543 cases, with a serious epidemic center in Springfield, and another in Fall River.

So far as I know, the attempt of the Massachusetts State Board of Health to follow the disease year by year is the first one that has been made to study the behavior of the disease as it affects one locality, and I thought that possibly certain conclusions to be drawn from the results in this state since 1907 might be of interest.

Taking, therefore, the four years for analysis, the disease has appeared in general as one affecting river valleys more than other localities, having been in the four years more or less constantly present in some part of the Connecticut and Merrimac Valleys. It is not apparently a disease of the coast towns by preference. There are nearly fifty coast towns in Massachusetts, and of these the bulk have been immune in each of the four years. That a coast town, may, however be visited by an epidemic has been clearly shown by the experience in Boston, and Fall River. Of the river towns, on the other hand, in the lower Connecticut and

Merrimac Valleys it may be said that in each of these four years the number of towns that have been immune have been in the minority. In 1907, when the disease was least frequent, the bulk of the cases were on these two rivers.

It has been stated by writers on the subject that localities severely affected one year were likely to be immune in the following year, and although this to a certain extent is true, it must be stated with many qualifications, judging from the experience in Massachusetts. Marked prevalence of the disease in a locality is apparently sure to be followed by a diminished prevalence in the following year, but not necessarily by immunity. The epidemic in Franklin County in the upper Connecticut Valley in 1908 was followed by practical immunity in 1909 and 1910; Boston, with 299 cases in 1909, has had only 11 reported in 1910; but taking the state as a whole the severe epidemic of 1909 was not followed by the immunity that we had hoped for in 1910. In the same way Norway and Sweden, which showed 2,000 cases in 1905, in 1906 showed 500 cases, a marked increase over former years.

It may, therefore, be said that so far as the figures go they show that when a small community is affected by an epidemic, in the following year there are likely to be very few cases in that small community, but that taking a larger area once affected by a serious epidemic the figures at hand show that, although in the following year there will be a diminution in the number of cases it will probably not fall to the level which obtained before the serious epidemic.

Another curious factor bearing on the question of two-year periodicity already mentioned is shown by the behavior of the disease in the western part of this state. In 1907, in the extreme western part of the state, there were some 30 cases, with Pittsfield as a center. In the following year there were only three cases in this part of the state. In 1909, however, the disease again appeared here, some 80 cases appearing in a narrow strip along the edge of the state, again with Pittsfield as a center, but in 1910 there have been only six cases reported from this part of the state. This phenomenon has been shown more strikingly here than in any other part of the state.

The disease seems to blaze up unaccountably in communities previously immune and in communities previously moderately affected. Up to 1910 Springfield had been almost immune, and in 1910 there were 120 cases in the city and 45 more in nearby towns. Fall River, on the contrary, had not been previously immune, for in 1907 there were six cases, in 1908 four cases, and in 1909 ten cases, yet in 1910 there have been 81 cases reported there, with 50 cases in neighboring towns. Other large cities, however, like Lowell and Worcester, have kept along with a few cases each year, and have not yet shown epidemics. It cannot therefore be stated from our observation so far, whether the presence of a few cases from year to year in a city or a locality is to be regarded as a favorable or unfavorable sign, but it can be said that almost complete immunity in a city has in one instance been followed by a very severe epidemic. The part of the state that has suffered least is a belt running North and South the whole depth of the state, beginning a few miles East of the Connecticut River and ending at the East in a line running North and East about through Concord, Mass.

The distribution in the state will therefore be seen to be rather erratic, leading to the formulation of only one or two rules, the most important of these being, it seems to me, that a community seriously affected one year shows a small number of cases in the following year, but in some instances again a large number of cases in the second year; that large communities, both immune and lightly affected, may become the seats of serious epidemics; and that a large territory seriously affected one year, on the following year shows a greater number of cases than prevailed before the epidemic.

With regard to the transmissibility of the disease there is, so far as I know, no dissenting voice among recent writers. We have had in Massachusetts instances of immediate transmission and what have appeared to be clear instances of transmission by a third person. In studying cases in 1910 we have made a special effort to find out if possible at what stage of the disease it is most likely to be transmitted, and what the period of incubation is. These figures have not yet been analyzed, and it is impossible to present any conclusions at the present time. We are making an attempt to investigate animal disease in the state, and we have

now traveling for purposes of this investigation a veterinarian, who is visiting veterinary hospitals, stock farms, kennels and poultry farms with a view to finding out if there was more animal disease in the infected localities than in the state at large. The conclusions from this investigation will be given in the final report.

As you know, the disease has been made a notifiable one in Massachusetts, and other states have followed the same course in requiring notification and in advising quarantine. This course is also pursued in Norway, Sweden, Germany and Austria. A very admirable pamphlet has been issued by the German Health Office for the use of physicians, dealing briefly with the symptoms of the disease and advising isolation during the acute stage, disinfection of discharges and bed linen, and disinfection of the sick room. It also advises that children from affected families should not attend school during the acute stage. Whether the danger of transmission ends with the end of the acute stage is a matter which is to be settled by further investigation. It seems to me that a very important part of the future work of the State Board is to lie in the determination of the conditions under which transmission occurs, and if possible the determination of the sources of infection from the patient.

It seems to me that in the present state of affairs it is clearly our duty to advise quarantine and the non-attendance at school of children from affected families. On the other hand, the community is thoroughly frightened and proceeds to extreme lengths in its fear of the disease, and I think we should lend our influence to spreading the information that the disease is not apparently very "contagious" in the ordinary sense of the term, and that although we should counsel every precaution during the time when we have reason to believe that the disease is transmissible, we should also do what we can to induce a sane and reasonable view of the situation. We must draw conclusions with care, and we must take particular pains to be sure that we are not too much influenced by the panic which has originated this last summer and which still exists.

234 Marlboro St., Boston.

DISCUSSION

Dr. JOHN L. MORSE. My experience with the disease is, of course, not so much from the point of view of its epidemiology as from the point of view of diagnosis. I suppose as a pediatrician I perhaps see more of the early cases in consultation than do the neurologists or the orthopedic surgeons.

It seems to me that the diagnosis is practically impossible in the early stages. Infantile paralysis may begin with any sort of symptoms, those of a cold in the head, of a cold in the throat, of a gastric disturbance, of an intestinal disturbance, in fact of almost any disease. I have not found in most of the cases, the sweating, the marked nervousness and the hyperaesthesia which have recently been said to be characteristic of the disease. In my experience they are more often absent than present. What it really amounts to, therefore, is that we cannot make the diagnosis until the paralysis appears. We may suspect that a child may be coming down with infantile paralysis if there is an epidemic, or if he has possibly been exposed, but otherwise we cannot make the diagnosis until the paralysis appears. In some atypical cases we cannot make the diagnosis at all. Children have it and get over it and we don't suspect it. For example—in a small colony at the seashore eight children of about the same age were constantly together. They all had a disturbance of the gastro-intestinal tract. No one of them was sick enough to be in bed. After their return home, ten days later, one of them was found to have a slight paralysis of the legs. I am certain that the other seven also had infantile paralysis and recovered from it without paralysis. In the very severe cases we many times cannot recognize it but mistake it for meningitis or something else.

Something has been written of late about lumbar puncture in the diagnosis of infantile paralysis. There is no question that animal experimentation shows that there is an excess of cells in the cerebro-spinal fluid in animals during the latter part of the incubation stage. There is no doubt that there is an excess of cells and an excess of fibrin in the cerebro-spinal fluid, both in animals and in the human being, very early in the disease, before the paralysis appears. In some cases there is an excess of cells

after the appearance of the paralysis, but these cells very quickly disappear. That is to say, in order to make a diagnosis through lumbar puncture we have got to do our lumbar puncture before the appearance of the paralysis, and in order to get the cases of infantile paralysis we have got to do a lumbar puncture on every sick child, which does not seem practicable. It is, therefore, of very little practical importance in diagnosis.

There is a class of cases of infantile paralysis which is very much like meningitis, some of them resembling tubercular meningitis, others cerebro-spinal meningitis. It would seem as if lumbar puncture ought to help in these cases. Unfortunately, barring the presence of tubercle bacilli, which are rarely found in a routine examination, the cerebro-spinal fluid in early infantile paralysis has exactly the same characteristics as the cerebro-spinal fluid in tubercular meningitis, and it does not help at all in the differential diagnosis. Examination of the cerebro-spinal fluid does help in the diagnosis between infantile paralysis and cerebro-spinal meningitis, because there we have an entirely different picture.

More or less has been written about hexamethylenamin, or urotropin, as a preventive of infantile paralysis and in the treatment. It seems to me that it is reasonable that it may have some preventive action if it is taken during the stage of incubation. At that time, however, there is no apparent reason for taking it, so that in order for it to be of any use it must be taken by all children all summer, which does not seem reasonable. I don't see how it can be expected to be of much use in treatment after the paralysis has appeared, because after the paralysis has appeared the trouble is done and we cannot stop it. It may be of some use after the paralysis in preventing the escape of the organism from the body, because it must get out somewhere although we don't know how. It may kill off the organism and help in that way.

Everybody, I suppose, is convinced that these patients ought to be isolated and kept in quarantine much in the same way as in scarlet fever. The great difficulty comes in knowing how long we ought to keep them in quarantine. That is a question which arises in every instance. As far as I know, there is no data at all to tell us how long. The rule that I follow is three weeks. It

may be that three days is long enough; it may be that three months is necessary. I think the boards of health would do us a great service if they would give us some definite time, even if it is wrong.

We are sure that we ought to isolate the patients. The next question is: Ought we to isolate the attendants? Are the rest of the family to be isolated? Is the doctor going to wear a gown? Is he going to use the same precautions as he does in seeing diphtheria and scarlet fever? I don't think most of us do.

I am constantly asked as to what people should do to prevent their children from having infantile paralysis. The only answer that I am able to give them is to keep away from places, if they can, where there is infantile paralysis; that is, don't deliberately go to a place where you know there is infantile paralysis; if you are there, keep your children away from other people as much as you can within reason.

The PRESIDENT. The subject is now before the Association for discussion or question.

Dr. STEVENS. What Dr. Lovett said in regard to quieting this tremendous fear that is abroad seems to be very wise. I think every doctor in this community is asked practically every day by some of his patients what they can do to prevent their children having infantile paralysis. Many of the children are kept in the house and kept away from school. They are put in the very worst condition to resist disease. I know a great many children that are not allowed to go out of doors at all for fear they will get infantile paralysis, and I should expect those children would be in very much better condition to have it than they would if they played out every day. I had one case of infantile paralysis in a town adjoining Cambridge. The father of that boy is a sausage maker, working in the sausage factory, and there is the possibility that he may be spreading the disease broadcast if he is allowed to work. There are eight children in the family; one child is sick. The oldest child is twelve years of age, and the youngest one year. The boy who is sick is six years old. It is impossible to isolate that child. The board of health have

excluded the other children from school, and I rather think they have kept the father from going to work, but I am not sure about that. It seems to be important that he should be kept away from the sausage factory. This tremendous fear it seems to me ought to be allayed. I hope this Association will put itself on record as recommending such a measure.

(On motion, the Association adjourned.)

MUNICIPAL SANITATION.

By CHARLES V. CHAPIN, M. D.,
Superintendent of Health, Providence, R. I.

DISINFECTION OF THE HANDS OF ATTENDANTS IN CASES OF CONTAGIOUS DISEASE. It is well known that absolute disinfection of the hands, such as is desired in surgical practice, is extremely difficult. This is doubtless due largely to the fact that we here have to do with a number of extremely common forms of bacteria, some of which are normal inhabitants of the human skin. On theoretical reasons it seems likely that it is much easier to remove from the hands such bacteria as typhoid, or diphtheria bacilli, cholera spirillae or gonococci, for these would probably be only upon the surface of the skin. Gaehtgens* has been investigating different methods of cleansing the hands after infection with typhoid bacilli. He finds that thorough washing with soap and water, followed by rinsing and wiping on a clean towel, are extremely efficient, but do not always render the hands free from all the germs. He has found alcohol more efficient than the use of more powerful disinfectants. It is desirable, if possible, to avoid the use of disinfectants, even alcohol, if the hands have to be frequently washed. If they can be washed in running water, much better results are obtained than when they are washed in a basin, even though they are thoroughly rinsed in another basin.

In the hospital for contagious diseases in Providence a mixing cock is used in all the set bowls, and both the hot and cold water faucets have levers 8 inches long, which are readily operated by the elbow, so that the handles of these faucets need never be infected. The hands are washed in running water, which can always be of the desired temperature. No disinfectants are used. Since the hospital was opened, last March, about 150 cases have been treated in the "cubicles" where different diseases are cared for by the same nurse. There has been, thus far, one instance of cross infection.

*Arch. f. Hyg., 1910, LXXIII, 233.

RECURRENCES FOLLOWING DISINFECTION AFTER SCARLET FEVER.* In Buffalo, in 1909, there were 3,029 cases of scarlet fever. Disinfection is said to be very carefully done in that city, and is tested by control cultures, and if found imperfect is done again. There were 117 recurrences of the disease after disinfection. This is at the rate of 3.8 percent. In Providence, since disinfection was abandoned, the recurrences after the removal of the warning sign for scarlet fever, have been at the rate of 2.81 per cent. of the cases.

RULES FOR THE KEEPING OF FOWLS AND PIGEONS.† The following rule has been adopted in the District of Columbia. "No person shall keep any kind of domestic fowl or pigeons within the District of Columbia within 25 feet inside the fire limits, or 50 feet outside the fire limits, of any structure owned by another and used for human habitation, occupation, or assembly, whether the said structure be in the same or an adjacent block or square, nor shall such fowls be permitted to run, fly or stray within 50 feet of any such structure. No such fowls or pigeons shall be kept in any square, or block having 75 per cent. of its lots improved, without a permit from the health officer of the District of Columbia, nor otherwise than in compliance with the following conditions." Then follow rules in regard to the cleanliness of houses, perches, nests, drinking fountains and yards, and finally it is specified that "No roosters are to be kept on the premises without the consent of the majority of the householders in that square or block."

TUBERCULOSIS TREATED IN CONTAGIOUS DISEASE HOSPITAL.‡ Forbes states that at the hospital for contagious diseases in Brighton, England, there have been cared for, during the last eight years, 1200 cases of consumption. None of these patients have contracted any other disease. The wards for the tuberculosis cases are quite near the scarlet fever ward, but separate nurses are provided for the tuberculosis patients, and these nurses eat and sleep apart from the other nurses. In Providence, since May last, the second floor of the diphtheria ward has been filled with consumptives. The nurses do not eat at a separate table, but mingle freely with other nurses.

* Report of the Department of Health, Buffalo, 1909, 20, 44.
† Report of the Health Officer of the District of Columbia, 1909, 73.
‡ Medical Officer, 1910, IV, 184.

DANGER FROM SOIL EXCAVATION. It seems rather surprising that at this late date the public should be afraid of emanations from freshly upturned soil. Yet recently, at least two health officials have had to meet very strong opposition to sewer construction on this account. Their observations may be of interest to others in a like situation. Guiteras* states that of 63 cases of typhoid fever which occurred in Havana during extensive sewer construction, not one was on the line of the work. Guiteras recognized the possibility of accidental infection of broken water pipes from workmen or soil during the progress of the work, and made special effort to guard against this. Systematic examinations were made of the soil to determine the presence of hook-worm larvae, but none were found. He believes, as do others, that the chief cause of an increase in malaria which sometimes follows operations of this kind is the importation of laborers who are harboring the malarial parasite. To guard against this in Havana Guiteras had the blood of every laborer examined for the *Plasmodium*.

Greene, of Charleston, studied the distribution of typhoid fever, scarlet fever and diphtheria, in relation to the work of excavation in that city and found that there was no reason to attribute to the overturning of the soil any cases of these diseases. There was no excess of typhoid fever, and of the 95 cases which occurred during the period under observation, only one, or possibly two cases, occurred along the 16 miles of excavation, and which in point of time were connected with the work of excavation.

SCHOOL INSTRUCTION CONCERNING INSECT CARRIERS. The very great importance of insect carriers in the south, has lead some cities as San Antonio and Jacksonville, to make great efforts to popularize knowledge concerning them. Terry states that in Jacksonville a series of moving picture shows, illustrating the life habits of flies and mosquitoes are given in the opera house, and all school children are required to attend. Special instruction is given by the teachers in a course of several lessons. Two prizes are offered for each school for the best essay on the subject, and two more prizes for the child who reports to the health department the largest number of breeding places of flies and mosquitoes.

*Sanidad de Beneficencia, 1910, III, 528.

AN ELASTIC WARD UNIT FOR CONTAGIOUS DISEASES. Dr. S. S. Goldwater, of Mt. Sinai Hospital, New York, has published in a recent number of the Bricklayer (Boston) a paper on the above subject. The design is for a hospital for a small or moderate sized city. Such hospitals usually consist of two wards, one for scarlet fever and one for diphtheria. Instead of two wards, Goldwater recommends a single ward considerably subdivided into rooms for one, two, three or more patients. There is connected with each end of the building a kitchen, nurses rooms and other administrative offices. If there chanced to be much diphtheria, and little scarlet fever, the larger part of the ward would be occupied with cases of the former disease. If now diphtheria should decrease and scarlet fever increase, as the diphtheria rooms became vacant, they could be successively shut off from the diphtheria end and connected with the scarlet fever end and used for the reception of scarlet fever cases. This of course, is a much more economical arrangement of ward space than is two entirely separate wards. Probably the reason why this plan has not been adopted before is because of the fear that it would be difficult to thoroughly disinfect the rooms, or that the germs would fly out of one window and into the next. Such fears have been shown to be groundless and there is no reason why the principle advocated by Dr. Goldwater should not be followed in the construction of hospitals for contagious diseases.

THE NOTIFICATION OF MEASLES. Sandilands, Medical Officer of Health of Kensington, London, Eng.,* comes to the conclusion that under present conditions the isolation of measles is of practically no effect in checking outbreaks, and that disinfection after the termination of the disease is unnecessary. He does believe, however, that much can be accomplished in checking the mortality of measles if severe cases occurring in the families of the poor, could receive hospital treatment. He thinks that a certain amount of space should be set apart in hospitals for contagious diseases for the treatment of cases of measles which require it, and he considers notification desirable in order that such cases may early be brought to the attention of the health officer.

* Pub. Health, 1910, XXIV, 26.

BIOLOGICAL LABORATORY NOTES.

By FREDERIC P. GORHAM,
Associate Professor of Biology, Brown University.
Bacteriologist, Providence Health Department.

DIFFERENTIATION OF B. PARATYPHOSUS AND B. TYPHOSUS. Kuhnemann* reports that the Loeffler method of staining the flagella shows that the relative proportion of the whole mass of flagella to the body of the bacillus is much greater in the case of the paratyphoid than in the typhoid bacillus. In the former the flagella are longer and more convoluted, while the flagella of the typhoid are fewer and shorter. The absolute number of flagella in both forms is variable but as a rule the paratyphoid has more than the typhoid.

DISEASES OF MUMMIES. M. A. Ruffer† reports a study of the diseases of Egyptian mummies of 5000 to 8000 years ago. He finds the lesions of pneumonia in some of the lungs and has succeeded in staining the organisms. He suggests that in another case the organisms which he found in the lungs may have been those of plague. He found cysts in the kidneys containing organisms which he says much resemble *B. coli*, in another, numerous eggs of *Bilharzia haemalobia* and in others urinary calculi.

DESSICATED CULTURE MEDIA. E. T. Thompson‡ investigated the practicability of preparing dessicated culture media using nutrient gelatin, agar, beef broth and MacConkey's neutral red bile-salt lactose agar. After these were dessicated and redissolved in distilled water at 100° C. the resulting media were quite clear and the agar and gelatin solidified with their original firmness. The reactions remained unaltered. Vigorous growth occurred with the several organisms which were tried and all the typical reactions were obtained. The advantages of such dessicated media prepared by standard methods will be apparent to all laboratory workers.

* Centbl. f. Bakt. Erste Abt. 53, 1910, 473.
† Cairo Scientific Jour. VI, 1910, No. 40.
‡ Lancet, May 21, 1910, p. 1411.

ACID-FAST AND GRANULAR TYPES OF TUBERCLE BACILLI. Wehrli and Knoll* found that a certain number of tubercle bacilli were stained both by the Ziehl-Neelsen and by Much's modification of Gram's method, a small number, however, could only be demonstrated by the former process, while about 50% were not acid-fast but retained the stain by the Gram-Much method. P. Wolff obtained similar results in smears from mesenteric glands of twenty-one children, and S. Rosenblat found similar conditions in the sputum. The two last named authors agree in regarding the granular bacilli as degenerate forms possessing a low degree of virulence, and they believe that under favorable conditions they may acquire anew the acid resisting capsule and thus return to the Ziehl-Neelsen type.

CULTIVATION OF LEPROSY BACILLI. Many attempts have been made to grow upon an artificial medium the acid-fast bacilli that are associated with the lesions of human leprosy. Clegg† grew an acid-fast bacillus from human leprous tissues with ameba and their symbiotic bacteria. Sugai‡ inoculated Japanese dancing mice with leprosy bacilli which multiplied at the site of inoculation and became disseminated throughout the animal's body. The successful transmissibility of leprosy to this species of mouse affords an excellent opportunity to determine whether or not the acid-fast organisms cultivated upon an artificial medium are in reality leprosy bacilli. Duval,§ recognizing the fact that leprosy bacilli are confined to the interior of body cells, prepared an artificial medium which was composed in part of substances which are the result of cell metabolism and the end products of proteid digestion. Portions of fully matured bananas were prepared aseptically, and introduced into sterile glass cylinders, provided at the bottom with cotton plugs saturated with sterile distilled water. The banana was then saturated with 1% solutions of tryptophane, cystein (made from protein) and leucein sterilized by filtration. A 2% nutrient agar of 1.5% titer was also

* Beitrage z. Klinik d. Tuberkulose Bd. 14, 1909, H. 2. (Centbl. F. Bakt. 1st Abt. Ref. XLVI, 1910, 397.)

† Philippine Jour. of Science, IV, 1909, 403.

‡ Lepra, VIII, 1909, 203.

§ Jour. Exper. Med. 12, 1910, 649.

used with the above mentioned solutions. Both the banana and the agar when saturated with a 1% solution of cystein proved excellent media when grown at 32°–35° C. exposed to the light in a glass incubato . Leprosy bacilli developed in the original cultures and continued to grow in subcultures. The morphological and cultural features were studied and inculations in Japanese mice produced typical leprous lesions. The author is at present at work upon the production of an immune serum.

SANITARY ENGINEERING NOTES.

By ROBERT SPURR WESTON,
Assoc. M. Am. Soc. C. E., Boston, Mass.

ILLINOIS WATER SUPPLIES AND TYPHOID FEVER.*

The author compares the typhoid fever death rates and the characters of the water supplies in the various counties of Illinois. The largest death rates are in the southern part of the state where the municipal supplies for the most part are from unfiltered sources and the rural supplies from wells in the shallow glacial drift. In this half of the state average typhoid fever death rates of over 40 per 100,000 for five years were common, and only one out of 51 counties had a death rate of less than 10 per 100,000 for five years; while in the northern half where most of the supplies came from deep wells in rock or in the glacial drift, there were 13 counties which had a death rate of less than 10. In the deep well section, which is northwest of a line drawn from Quincy to Chicago, there are only three counties with a death rate of over 25, and even better conditions prevail in the deep drift regions where none of the average death rates exceed 20. The only county in the northern section with a death rate of more than 40 is located outside of the deep drift area and the only one in the southern portion with a death rate of 10 is located in the same area, where not only excellent supplies for cities but even for farms and houses are obtained. In the southern part of the state good ground water supplies are scarce and the supplies from surface sources are not satisfactory as a class, which facts account in part for the high death rates. The improvement in conditions at Chicago, where the death rate has been reduced from 173 to 15.6 during 17 years is due to the extension of the water works intakes into Lake Michigan and the diversion of the sewage into the Chicago drainage canal. The author's statement that a further reduction in the death rate to 7 or 8 per 100,000, like that which prevails in Rockford, Ill., and in some European cities is possible, is undoubtedly true, but in order to reach this result not only must the water supply of the city be pure but other causes of infection and contagion must be overcome as well.

*E. Bartow, Eng. News.

ADDITIONS FOR WATER PURIFICATION.* Author gives excellent rapid method for the determination of the lime and soda required to soften water. 200 cc. of the cold water to be softened are mixed with 50 cc. of saturated lime water of known strength in a 250 cc. volumetric flask and heated to boiling. The strength of the lime water must be determined for each series of determinations. After cooling, the flask is filled to a mark with water, the contents are mixed and 200 cc. are filtered through a dry filter and titrated in a porcelain dish with $\frac{N}{10}$ HCl with methylorange as an indicator. The number of cc. of equivalent tenth normal lime used by the water multiplied by a factor gives the amount of lime required per million gallons. Then one adds to the neutralized solution in a porcelain dish 20 cc. $\frac{N}{10}$ Na_2CO_3 and heats to the beginning of boiling. The contents are then washed into a 250 cc. flask, cooled, filled up, mixed and filtered. 200 cc. of the filtrate are measured off and the excess of alkali titrated with $\frac{N}{10}$ HCl. The number of cc. of soda solution used by the water multiplied by a factor equals the number of pounds of pure sodium carbonate required per million gallons. The solutions must be accurately prepared. The correctness of the above amounts for the desired effect can only be proved by a practical experiment. For this purpose the author takes one liter of water and adds the calculated amounts of dry lime and soda and heats the whole to 70° C. Water treated in this way as a rule has a slight soda alkalinity and a hardness of less than eighteen parts per million.

THE PRODUCTION AND NEUTRALIZATION OF OZONE FOR WATER PURIFICATION AND OTHER PURPOSES.† Article notes date of discovery of ozone by Van Marum, 1783, and its properties. Its use has been very popular, but on account of the high cost commercial production has been possible only since the development of the alternating current generator and the high tension transformer.

The article describes many of the innumerable generators, including those by Tindal, de Frise, Siemens-Halske, Otto, Abraham

* Drawe, P., Z. Angew., Chem., 23, 52.

† Eng. News. Editorial and Original. 63, 488–490.

Marmier, Vosmaer, Bridge, Gerhard, Stynis and others. The modern machine produces concentrations as high as 10 grams of ozone per cu. m. of air and some of the new generators will yield as high as 100 grams per hour.

The efficiency of O_3 as a bactericide and oxidizer of organic matter is well known. Even imperfect mixtures of grossly polluted water and ozonized air in crudely contrived laboratory apparatus effect almost complete purification, but such facts do not place the water purification on a commercial basis. There is no change in the physical appearance of the water after treatment with O_3 and filtration is usually necessary in connection therewith. Ozone treatment is best adapted to sewage polluted waters whose appearance is satisfactory. Waters of turbid streams are least suited thereto. The process has to compete with the $Ca(OCl)_2$ process, which has nearly the same effect and is cheaper. One objection to the treatment is that the electric apparatus is delicate andcomplicated and requires skilled attendance. The O_3 processes are not yet standardized and at present it is difficult to determine what waters would be best treated by ozone. On the other hand, the effect of O_3 is unique in that it has almost no injurious effect on higher organisms when used for general sterilization. Its use as a special therapeutic agent is only at its beginning. Its use for water purification, however, should be carefully considered with reference to the special cases under consideration before adoption.

SEWAGE SLUDGE AND ITS INDUSTRIAL USE.* Author describes experiments in the city of Brunn in Austria made by Prof. Honig. The sludge, which is from the sewage of an industrial city, was dried in an experimental plant by means of a revolving drum filter covered with cloth and said to be self-cleaning. The dried cake contained 25% of water. 100 kg. of this mixed with 2 kg. of pit coal when distilled produced 23 cubic meters of good illuminating gas and 75 kg. of NH_3. The decision to utilize the sludge for the manufacture of gas was determined upon after experiments with other methods. Filter presses and centrifugal machines dried the sludge less well than did the hollow drum filter. In the latter the water filtered from the sludge is

* Bayer, A. Rev. chim. ind., 21, 279-83.

removed continuously by a pump while a jet of compressed air acting upon sections of the drum from the inside in order blows off the cake from the outside in the form of scales two or three mm. thick. With the machine they were able to obtain 33.3 kg. of dried sludge containing 22.5% of dry matter per square meter of filter surface. The filtering pressure required was 200 millimeters of mercury while the air was used at a pressure of 1½ atmospheres.

FORMATION OF NH_3 IN DEEP WATERS CONTAINING IRON AND MANGANESE.* Klut and Noll exchanged communications regarding the presence of ammonia in deep well waters, and especially in those containing iron and manganese. They are not agreed upon an explanation for the presence of ammonia. Both investigators await the results of further investigations. Other articles on the same subject by the same authors appeared in the same journal.

VALUE OF A CHEMICAL ANALYSIS AS SHOWN IN TRACING THE CAUSE OF A TYPHOID FEVER EPIDEMIC IN GEORGIA.† An instance where a typhoid epidemic was traced through chemical analysis to a water supply which had been declared safe after a bacteriological examination.

WATER PURIFICATION.‡ The author, who has published a short method (Z. oeff. Chem. 1907. 457) for the determination by computation based upon analyses of the chemicals necessary for water softening, criticises Drawe's method, which is based upon actual experiments with the water examined using lime water and sodium carbonate as reagents. The criticism is based largely upon the fact that simple determination by trial of the lime and soda required with no knowledge of the actual chemical composition gives an insufficient idea of the character of the water and no inkling that reagents other than lime and soda, for example NaOH, may be used to advantage. He believes it to be necessary to ascertain the presence or absence of certain

* Klut. Z. angew. Chem., 23 1934.—23, 1306, 107, 1307.
† H. B. Arbuckle, J. Ind. Eng. Chem., 2, 349-50.
‡ Hundeshagen, F. Z. angew. Chem., 23, 1262. 23, 878.

substances, like sulphates, iron and manganese. He states that an error might be introduced by using Drawe's method with waters containing large amounts of Mn and Fe for the reason that one part of hardness ($CaCO_3$) per million is equivalent to 0.56 parts Mn, 0.55 Fe, or 0.374 Fe. He recommends the term "non-carbonate hardness" to describe the hardness due to mineral acids, etc., in distinction to the carbonate hardness. He takes exception to Drawe's statement that carbonate hardness (alkalinity) is ever greater than the total hardness. Drawe in reply agrees with Hundeshagen that the total hardness consists only of calcium and magnesium carbonates and corrects a former mistake in his formula for estimating the necessary addition of chemicals to water containing an excess of alkaline carbonates.

PERSONAL HYGIENE.

By PERCY G. STILES,
Assistant Professor of Physiology in Simmons College.

Humidity.

An important work of the past year is Ronal C. Macfie's "Air and Health." (E. P. Dutton & Co., New York, 1909.) Among its well classified sections the two entitled "Humidity and Thermolysis" and "Humidity and Health" repay careful reading. The subjects of which they treat have seldom been so well presented.

It may be doubted whether any practitioner or physiologist feels satisfied with the reasons he is able to offer for the effects of dampness upon the human economy. The matter seems to call for a great deal more exact observation than has yet been given to it and for a rigorous separation of its purely physical aspects from those in which suggestion is involved. Every one has witnessed examples of an abnormal sensitiveness to changes of weather not by any means limited to distinctly hysterical individuals. An explanation is so difficult that a cautious and able writer (Tigerstedt) resigns the task and says that these agencies can only be accepted as "cosmic influences." Others, like Arrhenius, have emphasized the possible role of electrical changes as mediating between the outer world and the human system. In the chapters before us this serious lack of knowledge is admitted but we have an interesting collection of the facts already at hand. We have also some helpful criticism of the loose statements common in discussions of the subject.

We are reminded that the term "relative humidity" is of little value by itself. An approach to saturation does not hinder evaporation from the skin or from the respiratory passages unless the original temperature of the air is very high. A fully saturated cold air ceases to be saturated when the skin or mucous membrane warms it and therefore it abstracts water readily from such surfaces and absorbs heat in the process. The amount of water which the air can hold is approximately doubled for a temperature increment

of 27° Fahrenheit—a most convenient datum for rough calculations.

Dr. Macfie makes the suggestion that instead of referring to the relative humidity of air, which means little unless we consider temperature also, we may give the drying power of the air, that is the quantity of additional water which can be taken up beyond that already present when the temperature is raised to 98° F. This would be a distinctly physiological value and would indicate to a great degree the fitness of any particular atmosphere to environ warm-blooded animals. It is only with high temperatures that there can be any lack of drying capacity in this sense. Saturated air at 89° F. will not relieve the human system of its heat as fast as produced and a fever temperature will develop (Haldane). It is a paradox worth reasoning out that air at 131° F., containing the same amount of water as the saturated air at 89°, will take care of the heat production by virtue of the brisk evaporation which it permits.

Clearly enough excessive humidity sets a limit to human endurance when it accompanies high temperatures. How then does it affect us when the thermometer is low enough to insure against any failure to remove heat from the body? In the first place it lessens radiation. Thus the presence of much water vapor in the air may reduce the rate of heat transfer between the body and a cold wall. Similarly it lessens the heating effect of radiations coming to the body from the sun or from terrestrial sources. But with decidedly cold air and especially with air in motion the saving of loss by radiation is greatly overmatched by increased conduction. Hence dampness adds discomfort to winter as well as to summer weather. The surface temperature of the skin is lowered more by a moist than by a dry atmosphere when both are below the neutral region of 62–68° F. The vasomotor changes which serve primarily to protect the body against loss of heat but which incidentally threaten to cause internal congestions are directly in proportion to this lowering of surface temperature.

In view of what has been said we can understand the influence of high humidity with cold winds in producing conditions which invite infections of the mucous membranes. Modified vasomotor reactions may be the key to many other relations between humidity and health which have appeared obscure. We know the general

truth that surface cooling causes engorgement of internal organs but we do not know well what areas share in the reaction. Altered circulatory conditions in muscles and about the joints may possibly suffice to explain the discomfort of people with rheumatic tendencies when a chilly east wind sets in after a warm dry period. Dr. Macfie's supposition that the checking of perspiration actually limits the essential excretion of wastes is contrary to the general impression among physiologists. His suggestion that bacterial infections are more virulent in times of high humidity because the organisms have not suffered dessiccation may have some weight.

It is possible that the depression one experiences on passing from a dry to a wet atmosphere may be due in part to altered breathing movements. Dry air produces a tingling within the nostrils and a reflex reinforcement of the respiratory muscles. Brisk breathing has a general bracing and enlivening effect. Damp air if warm fails to produce such stimulation and the breathing sinks to a more shallow and indolent type. The sense of buoyancy and well-being produced by air freighted with certain odors—such as the so-called "salt smell" of decaying sea-weed—is probably secondary to deepened breathing which has set in with no conscious effort.

VETERINARY NOTES.

By W. L. BEEBE, D. V. M.,
Bacteriologist for the Minnesota Live Stock Sanitary Board.

REPORT OF THE INTERNATIONAL COMMISSION ON THE CONTROL OF BOVINE TUBERCULOSIS. At the September, 1909, meeting of the American Veterinary Medical Association, which was held in Chicago, an international commission on the control of bovine tuberculosis was appointed, the personnel of which is as follows:

W. C. Edwards, who for many years served in the House of Commons in Ontario and was elected Senator in 1903;

J. J. Ferguson, who is employed by the Swift Packing Co.

J. W. Flavelle, LL. D., a capitalist of Toronto and manager of the Wm. Davies Co., exporters and domestic bacon curers.

Ex-Governor W. D. Hoard, Wisconsin;

Dr. C. A. Hodgetts, Chief Health Officer of the Province of Ontario;

Dr. J. N. Hurty, Secretary State Board of Health, Indiana;

Dr. John R. Mohler, Chief of the Pathological Division, Bureau of Animal Industry, Washington;

Dr. V. A. Moore, Director of the New York State Veterinary College, Cornell University;

Dr. M. P. Ravenel, University of Wisconsin;

Dr. C. E. Schroeder, Superintendent of Experiment Station, Bureau of Animal Industry.

Mr. T. W. Tomlinson, Denver, Colo:, Secretary of the American National Live Stock Association;

Dr. Frederick Torrence, Director of the Faculty of Comparative Medicine, University of Manitoba;

Dr. J. G. Rutherford, Veterinary Director General of Canada;

Prof. M. H. Reynolds, Professor of Veterinary Science, University of Minnesota.

The commission was instructed to study the problem of tuberculosis among cattle and to report at the next meeting of

the Association upon reasonable and economic methods or systems to be recommended to both officials and live stock owners for the eradication of this great scourge of domesticated animals.

The commission held four meetings during the past year and recently made its report at the San Francisco meeting of the Association. In view of the personnel of the commission as selected by the association and of the fact that so much information on the subject has been made available through the work of similar bodies in other countries and researches of scientific and practical men in America and elsewhere, the commission did not deem it necessary to take any evidence either from expert witnesses or others. The commission realized that they could deal with fundamental principles only and that the details of the policy which they might outline must in each case be worked out by duly authorized and responsible representatives of the community immediately concerned. The history of the various efforts hitherto made by other countries throughout the world that have attempted to legislate on the subject was thoroughly studied. This led to the gradual elimination of methods other than those which might reasonably be adopted by any community. It was felt, in view of the prevalence of the disease, especially in some localities and among certain classes of cattle, the difficulty of providing a sufficient number of trained officials and the large economic questions involved, to say nothing of the numerous expenditure, that it would be unwise for the present at least, to seriously discuss the policy of universal compulsory testing and slaughter.

The committee report is divided into 15 resolutions and four subcommittees were appointed to minimize the risk of omitting from the deliberations of the committee any phase of the question. The four subcommittees were as follows:

1. Education and legislation.
2. Location of tuberculosis.
3. Dissemination.
4. Disposition of tuberculous animals.

The reports of these subcommittees are of particular interest.

There are many points in these resolutions that are of particular interest, and will probably prove of much value to those who are interested in this work.

The following is a brief account of some of the phases of the report. The management of live stock shows should give a preference to cattle known to be free from tuberculosis, either by providing special classes for such cattle or in some other practical way, and should always take precaution to prevent contact between such animals and those not known to be free from the disease.

The tuberculin test properly applied is an accurate and reliable diagnostic agent for the detection of tuberculosis. Tuberculin will not produce a reaction under the following conditions:

a. When the disease is in a period of incubation.
b. When the progress of the disease is arrested.
c. When the disease is extensively generalized.

All exposed animals should be retested at intervals of six months to a year. The commission recognizes that the discovery of tuberculosis in animals slaughtered for food purposes furnishes one of the best possible means of locating the disease on the farm, and therefore recommends the adoption of some system of marking for identification all cattle three years old and over shipped for slaughter.

That the policy of compensation be recommended as useful and usually necessary as temporary means. When slaughter is necessary in order to avoid economic loss every effort should be made to utilize as far as possible the meat of such animals if slaughtered under competent inspection. That with the hope of preventing the spread of infection, persons buying cattle for breeding purposes or milk production should except when such purchases are made from disease-free herds, which have been tested by a qualified person, purchased only subject to the tuberculin test.

The commission especially desires to appeal to the press, metropolitan, agricultural and local, to join in the work of extending as much as possible among the people the conclusions here arrived at.

They recommend that resolutions regarding the control and eradication of tuberculosis among domestic animals be made uniform; that the laws of the United States and Canada, and other American countries for the admission into America of animals from without be made stringent and as much alike as

possible; and that the laws governing the interstate and interprovincial movement of cattle and that between different American countries be harmonized.

Legislation is especially required to prevent the various frauds which interfere with the satisfactory use of tuberculin, as a diagnostic agent for tuberculosis, as well as for the official supervision over all tuberculin sold to be used by veterinarians and others.

None of the various methods for the immunization of animals against tuberculosis has passed beyond the experimental stage. The commission is unable to endorse any of these for practical use at the present time. The consideration of the eradication of tuberculosis among animals should have the approval and support of all those persons who are interested in curtailing human suffering and prolonging human life. The control, to say nothing of the eradication of tuberculosis, is impossible of achievement without the hearty cooperation of the men who are actually engaged in the cattle industry.

In concluding the report the commission suggests that the association should make such provision as may be necessary to carry on the work, either by continuing the commission as constituted at present or with such changes in their personnel as may be considered desirable.

SPOROTHRIX AND EPIZOOTIC LYMPHANGITIS. Epizootic lymphangitis, a disease that somewhat resembles glanders has long been known to exist in Europe, Africa and Asia, and recently was reported to exist in Pennsylvania. The disease is characterized by the appearance of subcutaneous nodules with thickening of the surrounding lymph vessels. The nodules frequently break down forming multiple abscesses which finally heal in most instances. Page Frothingham and Paige* have recently been doing some work on this disease. The material was obtained from cases in Pennsylvania and from their work they conclude that the horses from which the tissue was obtained were apparently not affected with the epizootic lymphangitis of Tokishiga. The only organism to develop a sporothrix is unlike the *saccharomyces farciminosus*, but is identical with that isolated by Dr. Hyde from a man.

*Journal of Medical Research, Vol. XXIII, No. 1, pp. 137-148.

METHODS EMPLOYED IN NORTHERN EUROPE IN THE CONTROL OF BOVINE TUBERCULOSIS. Dr. V. A. Moore presented a paper at the recent meeting of the American Veterinary Medical Association in San Francisco, in which he very carefully describes the methods employed for the control of bovine tuberculosis in Northern Europe. The difficulties attending the control of this disease in Northern Europe are not essentially different from those in this country. Their methods or system of control which have been adopted there, differ from those employed in America. It is apparent that the Europeans recognize the situation in its entirety more fully than Americans and consequently they are more willing to submit to methods which give increasing security and which tend eventually to eradicate the disease. It is recognized as a great scourge which became widespread before the significance of its existence was recognized. In all of the methods the cases of open tuberculosis are considered dangerous and are to be eliminated.

On the other hand clinically sound cattle which react to the tuberculin are not considered dangerous to any great extent at least, and the owners of such cattle sell the milk in open market, while in this country such an act would not be permitted. This makes the methods of Ostertag, Bang and the Manchester procedure possible.

Again owners of tuberculin reacting cattle are allowed to dispose of them as they please, thereby being able to eliminate infected animals to the greatest possible advantage and to establish sound herds at a minimum expense. The methods that are employed to eliminate bovine tuberculosis in several of the countries may be divided into two classes; the first which may be called the direct method consists of the government giving direct assurance to the cattle owner to aid them in their efforts to eradicate the disease from their herds. The second, which may be called the indirect method consists in certain local regulations to protect the people of the community against the danger of tuberculosis infection from milk and this indirectly interferes with the natural dissemination of the disease among cattle. While the method of Bang, which consists in isolating the diseased animals from the healthy and thus maintaining two herds and raising the

calves from pasteurized or sterilized milk is used very extensively in Denmark, this method, however, is not looked upon with as much favor in other portions of Europe.

The method at the present time which is receiving much attention in Germany is that proposed by Ostertag. It consists in eliminating by slaughter all clinical cases, removing the calves promptly after birth from the dams and keeping them separated for some months after which they are placed with the other cattle. During this time the calves are fed upon the milk of sound cows or on pasteurized milk of the infected ones.

The procedure which is known as the Manchester method and which is used in England at the present time consists in taking milk from the dealers and examining it at regular intervals for tubercle bacilli. If tuberculosis is found the examination extends to the individual cows in the herd from which the milk comes. Prof. Boyce, of Liverpool, states that by this method they have reduced the infected milk supply in the city to six per cent. In Holland at present animals belonging to breeders only are killed and compensated for by the government. Prof. Poels thinks that tuberculosis in cattle must be combatted slowly. He believes that the only way is to kill off the animals suffering with evident tuberculosis. Bangs method is not favored and is even considered impossible. Prof. Poels also lays special emphasis upon physical examination as a means of detecting tuberculosis. He emphasizes the importance of greater skill in clinical examination. It will be seen, however, that these methods differ very radically from those used at the present time in this country.

PUBLIC HEALTH LEGISLATION, NEWS AND NOTES.

By DR. B. L. ARMS,
Director Board of Health Laboratory, Boston, Mass.

MASSACHUSETTS LAW RELATIVE TO THE COMMON DRINKING CUP.*

AN ACT RELATIVE TO THE COMMON DRINKING CUP.

Be It Enacted, etc., as follows:

SECTION 1. In order to prevent the spread of communicable diseases, the state board of health is hereby authorized to prohibit in such public places, vehicles or buildings as it may designate the providing of a common drinking cup, and the board may establish rules and regulations for this purpose.

SEC. 2. Whoever violates the provisions of this act, or any rule or regulation of the state board of health made under authority hereof, shall be deemed guilty of a misdemeanor and be liable to a fine not exceeding twenty-five dollars for each offense.

SEC. 3. All acts and parts of acts inconsistent herewith are hereby repealed.

SEC. 4. This act shall take effect on the first day of October, nineteen hundred and ten. (Approved April 22, 1910.)

REGULATIONS CONCERNING THE USE OF THE COMMON DRINKING CUP.

At a meeting of the State Board of Health held on July 21, 1910, the following regulations were made concerning the use of the common drinking cup, in accordance with the provisions of Chapter 428 of the Acts of 1910:

On and after Oct. 1, 1910, it shall be unlawful to provide a common drinking cup:

(a) In any public park, street or way.

(b) In any building or premises used as a public institution, hotel, theatre, public hall or public school.

(c) In any railroad station, railroad car, steam or ferry boat.

* Acts of 1910, Chapter 428.

MASSACHUSETTS LAW RELATIVE TO TRADES, PROCESSES OF MANUFACTURE OR OCCUPATIONS INJURIOUS TO THE HEALTH OF MINORS UNDER EIGHTEEN YEARS OF AGE.

Chapter 404 of the Acts of Massachusetts of 1910 provides that the State Board of Health may exclude minors under the age of eighteen years from any trade, process of manufacture, occupation or method deemed by said Board to be sufficiently injurious to the health of such minors as to justify their exclusion therefrom.

CHAPTER 404, ACTS OF 1910.

Chapter five hundred and fourteen of the acts of the year nineteen hundred and nine is hereby amended by striking out Section seventy-five and inserting in place thereof the following:

SECTION 75. The state board of health may from time to time upon the written application of any citizen of the commonwealth, or upon its own initiative, after such investigation as it considers necessary, determine whether or not any particular trade, process of manufacture or occupation, or any particular method of carrying on such trade, process of manufacture or occupation, is sufficiently injurious to the health of minors under eighteen years of age employed therein to justify their exclusion therefrom, and every decision so rendered shall be conclusive evidence of the facts involved therein, except so far as the same may later be revoked or modified by a subsequent decision of the board. Whoever, after being notified that the state board of health has determined that a particular trade, process of manufacture, occupation or method is injurious as above stated, employs therein a minor under eighteen years of age shall be punished by a fine of not more than two hundred dollars and not less than fifty dollars for each offense, unless prior to the time of such employment such determination shall have been revoked or modified so as not to include the employment complained of.

(Approved April 16, 1910.)

The State Board of Health hereby declares the processes named in the schedule hereunder to be injurious to the health of minors within the meaning of Chapter 404, Acts of 1910, provided that the law shall not apply to any factory wherein such special measures are adopted as appear to the State Inspector of Health to be reasonably practicable and meet the necessities of the case:

I. PROCESSES INVOLVING EXPOSURE TO POISONOUS DUSTS OR SUBSTANCES.

1. Processes in the manufacture of white, red, orange or yellow lead.

2. Processes in the manufacture of lead pipe, solder and plumbers' supplies.

3. Cutting metal articles with a mixture of lead and tin, or lead alone.
4. Processes involving exposure to lead and the dust of plumbago in electrotyping.
5. Processes involving the handling of white lead or lead monoxide (litharge) in rubber factories.
6. Lead paint grinding.
7. Lead working in the manufacture of storage batteries.
8. File cutting by hand.
9. Typesetting, cleaning or handling type in printing offices.
10. Glazing in pottery establishments.

II. Processes Involving Exposure To Irritating Dusts.

1. Processes involving exposure to the dust of graphite in the manufacture of stove polish.
2. The operation of bronzing in the lithographing business, and the consequent exposure to bronze powder.
3. Cutlery grinding, and grinding or polishing in the manufacture of machinery, machine parts and metal supplies; and grinding, glazing or polishing on emery or buffing wheels.
4. Cutting, boring, turning, planing, doming, facing or polishing pearl shell.
5. Talc dusting in rubber works.
6. Sorting, dusting, cutting or grinding rags.

III. Processes Involving Exposure to Poisonous Gases and Fumes.

1. Spreading rubber on cloth and the subsequent exposure to naphtha in the manufacture of rubber goods.
2. The use of naphtha in cement work in rooms in shoe and rubber factories which are not provided with mechanical means of ventilation where the mixture containing naphtha is allowed to remain in uncovered receptacles.
3. Processes involving exposure to naphtha in the manufacture of japanned or patent leather.
4. Exposure to escape of fumes of gases from lead processes.

IV. Processes Involving Exposure To Irritating Gases and Fumes.

1. Gassing in textile factories.
2. Singeing in print works, bleaching and dyeing works.
3. Dipping metal in acid solutions.

V. Processes Involving Exposure To Extremes of Heat, and Other Conditions Which Promote Susceptibility to Disease.

1. Melting or annealing glass.

(Approved July 7, 1910.)

NEW HEALTH LAWS IN NEW YORK.*

AN ACT in relation to the inferior courts of criminal jurisdiction in the City of New York, defining their powers and jurisdiction and providing for their officers.

SECTION 78. IDENTIFICATION OF PROSTITUTES: FINGER-PRINT SYSTEM. In the night court for women, and such other courts as the boards of magistrates may designate, there shall be established and maintained the method of identification of prisoners known as the finger-print system. The finger-prints of all females convicted under subdivision four of section eight hundred and eighty-seven of the code of criminal procedure, subdivision two of section fourteen hundred and fifty-eight of the consolidation act or section one hundred and fifty of the tenement house law, shall be taken by purpose. Three impressions shall be made of all such finger-prints. One impression shall be classified and preserved in the court where the same was made; a second impression shall be promptly delivered to and classified and preserved in the office of the chief clerk of the division, and the third shall be forthwith delivered to the police commissioner. The board of city magistrates of each division shall designate a day court at which shall be arraigned women charged with the violation of the provisions of law in this section referred to, at which said court said finger-print system shall be established and maintained, in order that all persons convicted of the offenses in this section mentioned, whether arraigned in the day time or at night, shall be identified in the manner described.

SEC. 79. MEDICAL EXAMINATION OF PROSTITUTES. On and after the first day of September, nineteen hundred and ten, any person who is a vagrant, as defined in subdivision four of section eight hundred and eighty-seven of the code of criminal procedure, or who is convicted of a violation of subdivision two of section fourteen hundred and fifty-eight of the consolidation act, or of section one hundred and fifty of the tenement house law, shall after conviction be taken to a room adjacent to the court room, and there be physically examined by a woman physicain of the department of health detailed for such purpose. After such examination the physician making the same shall promptly prepare and sign a written report to the court of the prisoner's physical condition, and if it thereby appears that the prisoner is afflicted with any venereal disease, which is contagious, infectious or communicable, the magistrate shall commit her to a public hospital having a ward or wards for the treatment of the disease with which she is afflicted for detention and treatment for a minimum period fixed by him in the commitment and for a maximum period of not more than one year; provided, that in case a prisoner so committed to any institution shall be cured of her venereal disease, which is contagious, infectious or communicable, after the expiration of the minimum period and before the expiration of the maximum period for which she was committed to the institution, she shall be discharged and released from custody upon the written order of the officer in charge of the institution or of the department of health that the prisoner is free of any venereal disease which is contagious, infectious or communicable. If, however, such

* By Authority Chap. 659.

prisoner shall be cured prior to the expiration of the minimum period for which she was committed she shall be forthwith transferred to the workhouse and discharged at the expiration of said minimum period. Nothing herein contained shall be construed to limit the authority of a city magistrate to commit any prisoner for an indeterminate period to any institution now having authority by law to receive inmates for detention for a period of more than one year.

SEC. 89. COMMITMENTS TO STATE REFORMATORY FOR WOMEN AT BEDFORD. Whenever a woman between the ages of sixteen and thirty is convicted in the city of habitual drunkenness, of being a common prostitute, of soliciting on public streets or places for purposes of prostitution, of frequenting disorderly houses or houses of prostitution, or of vagrancy under subdivisions three or four of section eight hundred and eighty-seven of the code of criminal procedure, she may be committed to the state reformatory for women at Bedford, pursuant to the provisions of section two hundred and twenty-six of the state charities law, to be there confined subject to the provisions of such law and of any stautue relating to such reformatory.

Became a law June 25, 1910, with the approval of the Governor.

Passed, three-fifths being present.

DAMAGE SUIT ON ACCOUNT OF TYPHOID FEVER.*

Lieut. Carndale, of the Royal Navy of Great Britain, sued the proprietor of the Sun Hotel. It came about this way: The lieutenant took dinner at the hotel and ate six oysters. The oysters were raw. And then the lieutenant came down with typhoid fever. Whereupon he suspected the oysters. And then it came to light that the oysters came from a condemned bed. But it further came to light that the hotel keeper did not know of the bed being condemned or even dangerous. In the suit it was alleged that the guest relied upon the care and skill of the hotel keeper and ate what was set before him, and it appeared to the court that the hotel keeper had not exercised sufficient care in selecting his oysters.

The court found a verdict to the effect that typhoid fever was contracted as a result of eating raw oysters; that the guest had relied upon the care and skill of the hotel keeper; and that the hotel keeper was negligent of his duty in not caring better for the safety of his guests; and that the hotel keeper must pay the guest two hundred and sixty-four pounds.

All this occurred in the British dominions, but it might have occurred in Florida, except, perhaps, the verdict—what would it have been?

* Florida Health Notes.

CALIFORNIA STATE BOARD OF HEALTH NOTES.

The first of October the California State Board of Health passed the following resolutions:

"WHEREAS, It is the duty of the California State Board of Health to encourage and maintain a progressive campaign against all communicable and avoidable diseases which may endanger the health of the citizens of the State, and

"WHEREAS, The communicable diseases due to syphilis and to gonococcus infections are among the most prevalent and most harmful known to Medical Science, and

WHEREAS, the policy of the State Board of Health, of physicians, and of educators has hitherto been one of silence on this subject, therefore be it

Resolved, That the California State Board of Health declares that beginning January 1st, 1911, syphilis and gonococcus infections shall be reportable and shall be placed on the list of communicable diseases which local Boards of Health and Health Officers are required to report to the Secretary, it being provided, however, that until further action by this Board, physicians may report the facts concerning these diseases by office numbers instead of names of patients. Be it further

"*Resolved*, That this Board officially calls the attention of the citizens of California to the contagious and infectious nature of these diseases and request their co-operation in combating them by every available means—educational, sanitary, medical, social and moral."

This is certainly a great step in the right direction and the effect will be closely watched by all. California is doing a great work toward the education of the people and it is only through education that will arouse public sentiment that the greatest good will be accomplished.

How long before other States will follow?

NEW HEALTH OFFICER FOR PALO ALTO, CAL.

Herbert O. Jenkins, A. B., of Stanford University, California, for the past three years a graduate student of Massachusetts Institute of Technology, taking the Biological Course, has accepted the position of Health Officer of Palo Alto, California, where he will have supervision of the water and milk supplies and diagnostic work in addition to the general duties of Health Officer.

BOSTON BOARD OF HEALTH LABORATORY NOTES. For the third time in five years the Boston Board of Health Laboratory has been called on to furnish a man for the Middle West. In September, 1905, Dr. H. W. Hill, Director of the Laboratory since its establishment in 1898, was called to Minnesota. Burt R. Rickards, S. B., who succeeded him as Director, responded to a call from Ohio in 1908, and now Dr. Francis H. Slack, formerly in charge of this department of the JOURNAL, has left to accept the position of Professor of Bacteriology at the State Agricultural College at Manhattan, Kansas. Dr. Slack was born in Abington, Mass., where he passed his boyhood and youth; he graduated from Tuft's Medical School in 1898, after which he went to Taunton, Mass., as Apothecary at the Taunton State Hospital, 1899–1900, interne and assistant Pathologist at the same place 1900–1901, was Admitting Physician at the Boston Dispensary, Boston, 1902–1904.

In May, 1904, he was appointed as Milk Bacteriologist to the Boston Board of Health and while in this position devised many methods and pieces of apparatus which are in common use today where bacteriological milk work is done.

When the Laboratory Section of the American Public Health Association at the Boston meeting in 1905 appointed a Committee to study the various methods used for the Bacteriological examination of milk and to recommend a uniform procedure Dr. Slack was made one of the Committee and in 1907 was made Chairman.

All members of the American Public Health Association are cognizant of the quality and quantity of work done by this Committee, the final report, made at the Richmond Meeting, appearing in this JOURNAL, June, 1910, pp. 315–345. In 1905 he was appointed Assistant Director and Director in 1908.

Among the papers he has written are: "The Microscopic Estimate of Bacteria in Milk," "The Comparative Value of Bacterial and Temperature Regulations for a City's Milk Supply," "Methods of Bacteriological Examination of Milk," "Longevity of B. Tuberculosis in Sputum," "Diphtheria Bacillus Carriers in the Public Schools." "A Resume of Diphtheria Examinations Made in the Boston Laboratory During 1909."

By promotion, Dr. B. L. Arms becomes Director of the bacteriological laboratory of the Board of Health, and E. Marion Wade, B. A., Asst. Director. Dr. Charles F. Whitney, who was appointed Asst. Bacteriologist in July to fill the vacancy caused by the resignation of Dr. W. S. Blanchard who returned to his Alma Mater, Tufts Medical School in June to accept the position of Instructor in Pathology and Bacteriology, becomes Bacteriologist. Dr. James J. Scannell, Milk Bacteriologist in this laboratoey in 1906–1907, and since then in general practice, was appointed Asst. Bacteriologist, October 22d.

ANNOUNCEMENTS AND COMMUNICATIONS.

IMPORTANT LEGISLATION: It is of the utmost importance to all scientific journals, such as the Journal of the American Chemical Society, the Journal of the American Medical Association, and this Journal, that the Dodds Bill, now before the Committee on Post Offices and Post Roads, be passed by the National Senate during its winter session. We strongly urge YOU to write to your present senators, requesting the passage of this bill.

SENATOR DICK (OHIO) IN FAVOR OF DODDS' BILL.

In a recent letter to the managing editor of this Journal, Senator Dick says: "It affords me great pleasure to say that I am in entire sympathy with the purposes of the Dodds' Bill to which you refer, and any assistance I can render in securing its enactment into law at the coming session of Congress will be gladly given."

CHICAGO AND BOSTON DEATH RATES:

AUGUST 11, 1910.

Dr. Samuel H. Durgin, Editor, American Journal of Public Hygiene, Boston, Mass.

DEAR DOCTOR: In your issue of June, 1910, on page 378, there appears an article by Dr. W. H. Davis, entitled "Boston and Chicago Death Rates," which I think should not go unanswered.

The paper is strangely unscientific. It contains reflections upon the accuracy of Chicago mortality statistics, which should be refuted out of justice to the Bureau of Vital Statistics of the Chicago Department of Health. No good purpose can be served by allowing these statements to go unchallenged. A proper regard for the science of vital statistics demands that certain other points be discussed.

The first point made by Dr. Davis is a correction of the crude death rate for Chicago and Boston according to the nativity and age indices found in the registration area. A study of this point, to be of value, would require that many, many additional factors be considered. For example: A Polish population newly come

into a section is almost wholly an adult male population; its infant mortality would be negligible. Ten years later that same population would have a large infant population and a high infant mortality. In ten years more that same population would have a relatively smaller infant mortality.

My only criticism of this point is that while it is quite proper in its tendencies it disregards so many vital factors as to be unweighable as evidence.

Corrections founded on an accurate study would be very valuable. Nevertheless Dr. Davis proceeds to add his corrections as though they were actualities, and represented a full study of the subject. All through his paper these so-called corrections are employed.

The doctor's second point is a correction based upon the larger percentage of the total number of deaths in Boston among non-residents than in Chicago. He then adds to the Chicago totals the same ratio of non-residents as shown in the Boston figures. These additions are figured in the tables quite regardless of whether he is figuring infant or adult mortality. The assumption is that a certain number of thousands of non-residents dying in Chicago are gotten out of Chicago without appearing in the totals. This, of course, is not true. He does not even claim it is true. He merely figures that if the figure in Boston is so and so, then in Chicago it must be something else.

I do not know what the explanation of the difference between the Boston and Chicago non-resident figures is, but this is what occurs to my mind:

The Massachusetts General Hospital is a state hospital. The poor who drifted in are recorded against the place from which they came. The Cook County and Dunning Institutions are county institutions. Legally they are open alone to residents of Cook County. A large part of the winter mortality from pneumonia and of the general mortality from consumption are among the drifters of society, men who can scarcely say they have a home anywhere. Our months of heaviest mortality are those in which many thousands have drifted in from the lakes, railroads and fields to lie up in Chicago and drift out when the spring opens up. Those among this class of drifters who die generally die in Cook County Hospital or the Dunning Institutions, and the deaths

occurring in both of these institutions are figured in the Chicago mortality.

I doubt if any correction should be made for differences in non-resident deaths. If there should be it should not apply in equal ratio to infants. It should only be after much closer study of the decedents than has been made here.

The correction for sex is too slight for any consideration.

The principal correction is that based upon the statement that the Chicago returns are inaccurate. Here the Doctor works his figurer again and adds 2940 to Chicago's death record, and, with a moderate sprinkling of "ifs" proclaims the Chicago rate as "16.67 instead of 14.94."

This is an age of publicity. The newspaper is abroad in the land. The gentleman from Boston may be guileless enough to believe that we could secrete 2940 deaths a year in Chicago and not be found out, but I think he would stand alone in his innocence.

In 1900 the census enumerators in Chicago made a return of the deaths reported as having occurred in Chicago. They reported 1930 deaths as having occurred at given numbers during the census year which were not found on the registration books of the Chicago Health Department as having occurred at the numbers given and during the year under investigation. They failed to find 40 per cent. of the deaths which we have recorded. Now, why doesn't some one claim that our death returns are 40 per cent. too high? Up to this point, which seems the more accurate, the returns of the Chicago Department are those of the census office. As soon as the census figures appeared they were investigated.

Regarding the addition of 1930 deaths to Chicago's mortality record for the census year 1900 by the U. S. Census Bureau authorities, the following statement is made by the Chicago Department of Health:

For the Census Year of 1900 (June 1, 1899, to May 31, 1900), the U. S. Census Office collected mortality statistics for certain cities in two ways—one, by having transcript made of the official records of death on file in the Department of Health; the second, by having census office enumerators in their house-to-house canvass enquire as to deaths that occurred *within* the census year, recording all such deaths on blank forms for that purpose.

In the Census Office the Health Department records were checked with the enumerators' returns and all enumerators' records not found on the records of the Health Department were added to the mortality records of that city. By this method the Census Office added 1930 deaths to Chicago's official returns.

As soon as this came to the attention of the Commissioner of Health in Chicago a request was addressed to the Director of the Census asking that a transcript of the added records be supplied to the Chicago Department of Health that the same might be run down and any errors or omissions corrected.

The transcript was furnished in due season setting forth the following data which might serve for purposes of identification: (a) Name of decedent; (b) color; (c) sex; (d) age; (e) social status; (f) date of death; (g) cause of death; (h) attending physician—*but not the place of death.*

Trained investigators were assigned to the work but it was soon found that it would take months of labor to run down the entire list of supposed omissions and therefore it was decided that the first 200 entries should be thoroughly investigated and results accepted as an index of the whole list of 1930 entries.

The results of the investigations of the first 200 entries on the transcript of enumerators' records which were added to the Chicago official records were as follows:

One hundred, or exactly one-half of the 200 deaths supposed to be missing from the Chicago mortality records, were found on the Health Department records, and 100 could not be located on records or by searching inquiry of reported attending physicians, or coroner's office records, or on reference to city directories. Fifty-four, or more than half of the traced records, were found to be deaths that occurred outside of the Census Year (before June 1, 1899, or subsequent to May 31, 1900)—26 were found within the census year included in our transcript, but the enumerators had so grossly misspelled the decedents' names that the records could only be identified on comparison of other data—16 were deaths of Chicagoans who had died in other parts of the country, their bodies having been shipped to Chicago for burial and under such circumstances these deaths not chargeable as Chicago deaths; (to more than offset this latter omission we count the death of every non-resident dying in the city; of every person dying on

boats, railroad trains, etc., bodies being brought to Chicago, frequently from distant parts; of every person whose body is removed from Lake Michigan and brought to Chicago for inquest; of every person dying in the County Institutions at Dunning, Ill., which is outside the city limits—the deaths in the latter institutions numbering above 1000 each year)—4 were of infants who had never breathed and therefore true stillbirths and not chargeable as deaths.

One hundred of the enumerators' reports of death—out of the first 200 entries examined—could not be traced even after the most searching inquiry. The names of supposed decedents could not be found in the city directories of 1898, 1899, or 1900, nor were any of them on the poll lists in the Election Commissioner's office. Inquiry was then directed to the *reported* attending physician, that is, in such cases as the *reported* attending physician could be found, and here let it be said that in the majority of instances the "attending physician" appears to have been a purely fictitious individual. In such of these cases where the attending physician was found the physician denied having attended any such case and furthermore denied knowledge of any such patient. Seven of these non-traceable enumerator's records were of deaths from violence, therefore Coroner's cases. Search of the Coroner's records failed to reveal any such names as those reported, and by none other of the given data could they be identified. It is beyond possibility for violent deaths to occur and escape detection in any such proportion as these records would indicate. Either the names of the decedents and other relating data are so grossly misstated as to be impossible of identification when compared with the official records or the enumerator's records of such are purely fictitious.

But one conclusion is possible from this statement of facts, and that is that the action of the Census Office in adding the unchecked enumerators' returns of death to the official record of deaths of Chicago was wholly unwarranted and renders the statistics of deaths for Chicago for the Census Year of 1900, as published by the Bureau of the Census, inaccurate, misleading and worthless. The census of 1910 has abandoned this method.

Early in 1906, the Chicago Medical Society having learned of the statements made in the census report, appointed a committee

to investigate the accuracy of the vital statistics of the Chicago Health Department. In the Health Department Bulletin dated April 28, 1906, is that report:

"Among many reasons the following may be given why the committee believe that the Health Department is obtaining reports and recording all the deaths that occur in the City of Chicago and is making accurate use of the same in the compilation of vital statistics:

"1. No permit for the burial or shipment of a body can be obtained in the absence of a certificate of death properly signed by a physician.

"2. Certificates of 'Unknown Cause' of death are invariably referred to the Coroner for his certificate as to the cause of death.

"3. Bodies found in the lake or waters adjacent to the city, or of persons dying on trains, boats, etc., which are brought into the city, are recorded by the Department in the city's mortality, regardless of the place of death.

"4. Deaths occurring at Cook County institutions, even though oustide of the city, as the Dunning Asylum, Tuberculosis Hospital and the Infirmary, of all persons that were sent there from Chicago are included in the city's mortality.

"5. Registration of deaths now includes all deceased infants that have breathed, but prior to November 1, 1905, infants surviving less than twenty-four hours were classed as still-births.

"6. It is the committee's opinion that no body can be disposed of in the city of Chicago, by burial, cremation or by shipment in a public conveyance, without being recorded by the Health Department. (a) Bodies used for dissection are receipted for by the Demonstrators' Association and recorded by the Department as having been buried in a certain Medical College, based on a certificate returned by the college clerk. (b) Cemetery clerks' records of burials are checked monthly, and must agree with the department records, thus preventing surreptitious interments. (c) Railways or other methods of public transportation will not accept a body for shipment without the Department certificate. Shipment of a body surreptitiously by rail or boat would require the connivance of the undertaker, shipping agent, baggage or expressman, receiving agent and undertaker.

"7. The death rate of the City of Chicago is based on the United States Census Bureau enumeration of the population for 1900, while the Census Bureau estimate of annual increase, which is 0.1 of the increase between the Census enumerations of 1890 and 1900. This method gives a population for 1905 of 1,990,750, the estimated annual increase being 59,872. These figures in the opinion of the committee give too low an estimate, though probably more accurate than the larger estimates of the School Census or the City Directory.

"8. The records of the Department's investigation of the discrepancies between the United States Census Bureau returns for 1900 and those of the City Health Department clearly demonstrate to the satisfaction of the committee the greater accuracy of the Health Department figures, because of the fact that the Health Department's figures were based on official facts (death certificates), while the Census Bureau's figures were based on inquiries.

"Signed,)

ALFRED C. COTTON, *Chairman.*
ADOLPH GEHRMANN, GEO. W. WEBSTER,
WELLER VAN HOOK, J. A. PATTEN,
L. HEKTOEN, N. S. DAVIS."

If we go back to the census report, we find that it did not purport to be or intend to be accurate. It tried, in a very broad way, to establish which cities were furnishing statistics that were accurate enough for acceptance. It was an indicator and not an accurate check. The government accepted it as indicating that Chicago was not only up to the standard of accuracy but was above the average, of the towns investigated as indicators. It was not claimed then or there or since or anywhere that the census figures were more accurate than the Chicago figures and nothing was there said which would lead any trained mind to use those figures, as an index, for correction of crude death rates. This very crude method of testing the accuracy of the returns was plainly stated to be what it was. Why Dr. Davis, in a scientific study of vital statistics, should have disregarded the plain meaning of words is difficult to understand.

Dr. Cressy L. Wilbur, Chief of the Bureau of Vital Statistics, Department of Commerce and Labor, in discussing Dr. J. N. Hurty's paper before the Section on Hygiene and Sanitary Science of the American Medical Association, said: "At Washington we are receiving statistics from all registration states and cities, and there is no city in the union which sends better reports or where the causes of death are more perfectly run down than Chicago."

If Dr. Davis will read the Bulletin of the Chicago Health Department he will find some things which will interest him. For interest in the Bulletin of Jan. 1, 1910, he will read:

The factors making for Chicago's good health may be briefly summarized as follows:

First—and most important: A very large percentage of our citizens are young and sturdy—the physical cream of every foreign land and every state.

Second: The great body of purifying water, Lake Michigan, at our front door.

Third: Our purifying winds.

Fourth: Right living.

Fifth: Governmental control.

For the first three of these we have no right to plume ourselves, and while we have every right to be congratulated for our good luck, we have no right to claim superiority over our fellows for good living.

These statements are clear, direct, concrete. While they are not accurate, they do not pretend to be. They cover the case.

I am sorry that it has been necessary to call the attention of this Journal to these errors, but it did not seem to me to be wise from the standpoint of Chicago or of statistics in this country to have them pass without contradiction.

Having read some of the valuable logarithmic calculations of factors for correction of vital statistics for England and certain continental countries, I have disliked exceedingly to find Dr. Davis departing from the fairly well established scientific method.

Yours very truly,

(Signed) W. A. EVANS,

Commissioner of Health.

Chicago, Ill.

NOVEMBER 7, 1910.

Dr. Samuel H. Durgin, Editor, American Journal of Public Hygiene, Boston, Mass.

DEAR DOCTOR: A brief reply to Dr. Evans, Commissioner of Health of Chicago, will not, I trust, be out of place.

The paper, "Boston and Chicago Death Rates," was intended to show that the uncorrected death rates of Boston and Chicago ought not to be taken as indices of the relative health conditions of the two cities. The paper did not pretend to discuss all the differences existing in the two cities—for example: In Chicago it is customary to reckon as Chicago deaths certain deaths occurring in institutions outside of Chicago, while in Boston such deaths are credited to the towns or cities in which they occur. Again, in Chicago, previous to 1905, deaths of children less than twenty-four hours old were classed as still-births, while in Boston deaths of children who have breathed at all have always been included in the total deaths. Many other minor differences doubtless exist which would require consideration to determine absolutely the needed corrections for death rates. But my paper and charts as presented, dealing with the needed corrections for age, color, parent nativities and non-residents, were sufficiently complete to show how absolutely worthless are deductions drawn from uncorrected death rates.

Dr. Evans maintains that the relative ages of a Polish immigrant population just arriving in this country will change so greatly in ten years that the figures of the 1900 census for example, become "unweighable as evidence." In 1900 the census figures must be considered as accurate. As we get farther and farther away from the Census year, it is well understood by every one that calculations based upon the Census figures become less and less reliable. But, I maintain that the corrections found necessary for 1900 were even in 1909 "weighable as evidence," for immigrants were coming to this country many years before 1900 and in 1909 were still coming, so that the relative ages of the immigrant population probably had not changed so very much. Certainly, in the absence of more recent population figures for comparison, it seems fair to use the corrections found necessary in 1900 until the details of the 1910 census become known.

Dr. Evans says: "The assumption is that a certain number of thousands of non-residents dying in Chicago are gotton out of Chicago without appearing in the totals. * * * * He figures that if the figure in Boston is so and so, then in Chicago it must be something else." No such assumption was either made or intended. The statement in the paper seems perfectly clear, and was as follows: "If the deaths of non-residents had affected Chicago, as much as they did Boston, Chicago's death rate would have been raised 1.71."

From Dr. Evans' letter, it appears that decedents having an unknown residence are reckoned as residents of Chicago. This is also true in Boston. The Massachusetts General Hospital, by the way, is not a state hospital.

Dr. Evans continues: "The principal correction is that based upon the statement that the Chicago returns are inaccurate."

Now, far from being the principal correction, the question of inaccuracy is not included at all in the corrections indicated in the tables and charts, and is only mentioned briefly upon the authority of the 1900 census. Dr. Evans' explanations on this point are given in great detail and should be gladly accepted by all.

Using the population figures of the 1900 census, it was found necessary to add 3.99 to Chicago's death rate as a correction for ages, color, nativities and non-residents, when comparing that city with Boston. It will be very interesting to see what the correction will be when based upon the figures of the 1910 census.

Very truly yours,

(Signed), WILLIAM H. DAVIS,

Vital Statistician, Boston Board of Health.

BOOK REVIEWS.

The Sources and Modes of Infection. By Charles V. Chapin, M. D., Sc. D., Superintendent of Health, Providence, R. I., Author of "Municipal Sanitation in the United States." First edition. New York: John Wiley & Sons. London, Eng.: Chapman & Hall, Ltd. Cloth, 5¼ x 8 ins.; pp. 399. $3.00, net.

Sanitarians have for several years eagerly awaited Dr. Chapin's book on infection; and the anticipations excited by his shorter papers on the subject are more than realized in this admirable volume. It was to be expected that the scientific openmindedness of the author would lead to generally sound results but the exhaustiveness with which his conclusions are enforced by detailed citations from original authorities cannot fail to surprise those who are acquainted with the demands made upon the sanitary executive of a large city.

Dr. Chapin's book "is intended to indicate the principles which should guide sanitary practice; and to show how recent laboratory work and the epidemiological study of disease have modified these principles." He reviews first the bacteriological evidence in regard to the life of disease germs outside the body which shows that "while it is possible that the anthrax and tetanus bacilli and the pus-forming bacteria may develop in the soil, there is no evidence that they commonly do so. It is also possible that the typhoid bacilli, and to a still less extent the bacteria of cholera, dysentry and plague, maintain a limited saprophytic existence, but this is probably very unusual. There is ample epidemiological evidence that in temperate climates such a source for these diseases must be an almost infinitesimal factor in their development. Probably the diphtheria bacillus never has a saprophytic growth of any significance, unless possibly very rarely in milk. As for tuberculosis, pneumonia, influenza, cerebro-spinal meningitis, scarlet fever, typhus fever, small-pox, whooping cough, gonorrhea and syphilis, malaria, yellow fever and sleeping-sickness, there is not the slightest reason for supposing that they ever develop outside of the bodies of animals."

The human body is thus the important source of danger; but as Dr. Chapin points out in his second chapter, on carriers and missed cases, it is by no means only the obviously sick who are to be feared. In pneumonia, in epidemic cerebro-spinal meningitis, in diphtheria and in typhoid fever, there is ample evidence of the important part played by mild cases, by convalescents, or by those who carry virulent bacteria without any symptoms of disease. Dr. Chapin points out that the existence of these carrier-cases profoundly affects the problem of isolation of the sick and necessitates considerable discretion in its enforcement.

These chapters on the source of infection in the human body are followed by a discussion of the modes by which it spreads from person to person. Dr. Chapin first takes up the question of Infection by Fomites and Infection by Air in two of the most important chapters in the book. He begins this discussion by showing how strong the evidence once appeared that yellow fever was spread by fomites. He says: "The proofs that it is a fomites-born disease were far more numerous and stronger for yellow fever than for almost any other disease. Yet we now know that yellow fever never was, nor could be, transmitted in such a way. Such a mistake, a mistake which cost millions upon millions because of the needless interruption of commerce, and disinfection, should make us careful how on similar, but weaker evidence, we attribute importance to fomites as a means of infection in other diseases." The epidemiological evidence of the spread of disease by things rather than by persons proves indeed on examination to be almost *nil*, and Dr. Chapin's own experience in giving up disinfection after diphtheria in Providence with no disastrous effects is almost a demonstration of the practical inutility of the ordinary procedure. His final conclusion that "there is no good epidemiological evidence that any disease except those due to spore-forming bacteria are to any great extent transmitted by fomites" seems fully justified by the facts.

Similarly the bogey of air-borne infection fades away before a scientific analysis. Even in the case of small-pox "the evidence in favor of the aerial transmission" is so slight that it should never influence a municipality in its selection of a hospital site." Dust and mouth spray and sewer gas are shown to be of limited importance; "most diseases are not likely to be dust-borne, (and they

are spray-borne only for two or three feet), a phenomenon which after all resembles contact infection more than it does aerial infection as ordinarily understood." We come back to the individual and his fresh excreta, as the central point of danger. To erect adequate barriers between him and his fellows is the chief task of the sanitarian.

The really vital and important vehicles of infection are reviewed in three chapters on Infection by Contact, Infection by Food and Drink, and Infection by Insects. These are the modes by which fresh and infected excreta are carried from the infected to the normal person. All are well handled by the author and on such vexed questions as the part played by milk in the spread of tuberculosis and by flies in the transmission of typhoid fever his conclusions are moderate and judicious.

The chapter on contact should prove of special value as the importance of this mode of infection is still inadequately grasped by sanitary authorities, particularly in the case of typhoid fever. The spread of gonorrhea by nurses in the Babies Hospital in New York forms a striking contrast with the striking success obtained at the Pasteur Hospital in Paris and at the Monsall Hospital in Manchester where all sorts of contagious diseases are treated in open wards but with special precautions for "*antisepsie medicale.*"

As Dr. Chapin says, "sanitary science is far from exact"; and he adds in another place, "I would be the last person to assert that the views here set forth are unassailable and unalterable. They doubtless will be modified; it may be that they are entirely erroneous." It seems to the reviewer, however, that in all essential points Dr. Chapin's conclusions are in accord with the evidence now available and form a sound compendium of the present status of sanitary knowledge.

The book might be justly criticized from one standpoint on the ground that its emphasis is so largely on things the health officer should not do, rather than on those he should do. Its effect on some readers will no doubt be to inspire a certain feeling of discouragement as to the whole public health program. Just such a book is much needed, however, today, when so much inherited rubbish cumbers the sanitary workshop. Dr. Chapin's book should be studied and re-studied by every official entrusted with the expenditure of public funds and the conduct of public

education in sanitary matters. It will save much waste of municipal appropriations and will prevent the dissemination of much harmful misinformation. Perhaps some day Dr. Chapin or some one equally qualified will write a book on the constructive side about positively helpful lines of board of health work and their relative importance; but such a book can be written better in five years than today.

C.-E. A. WINSLOW.

Education in Sexual Physiology and Hygiene. By Philip Zenner. Robert Clarke Co., Cincinnati.

As stated on the title page this is "A Physician's Message." The book is published by the Robert Clarke Company, of Cincinnati, and contains 126 pages of well worded and practical information on methods of presenting the facts of sex-hygiene and physiology to the schools and the public. The first half of the book gives the substance of four excellent talks which the author gave before students from twelve to sixteen years of age. The first three—(1) Hygiene, (2) Habit, (3) Alcohol—were given before mixed classes, the fourth, or "sex talk" was given to the boys alone (a similar talk being given by a woman physician to the girls). The reader appreciates, as he reads these talks, the force of the author's repeated warning, that "the instruction should be given so as to do the most good, and the least harm possible, especially so as not to arouse morbid fears"; that "the aim should be, instead, to inspire high ideals which ennoble life." The talk before college boys is excellent and to the point.

The last three chapters on "Mode of Teaching," "The Teacher", and "An Added Word", should be read by all persons intending to identify themselves with this new movement in health conservation. It is evident that the author believes that more harm than good results from much of the so-called sex-teaching. Since the child usually gets information—or misinformation rather—at an early age on the street, and often acquires bad habits early, and not rarely disease, and since "one-half the children leave school before they are twelve or thirteen years old"—"what school instruction they are to get they must receive before that age."

The author makes a good point in advocating such instruction to be given "verbally rather than by book or phamphlet." Specially trained teachers are advocated—"To-day there is nowhere training of this kind. It should be the function—and, really one of the most important functions—of normal schools and universities to give this instruction."

The final chapter deals with the value of athletics as a "safety-valve," and with the crowded tenement house, lack of privacy, and low wages as factors in the problem. The conditions which all but prevent early marriages are given due weight.

Altogether the book is an excellently written, sincere, helpful outline of what a well informed physician has done in this difficult field of education. The book should have a wide distribution among teachers, and parents.

WILLIAM F. SNOW.

Berkeley, Cal.

Infant and Child Mortality. Report by Arthur Newsholme, M. D., Medical Officer of Local Government Board, England, 1910. Price, 1s. 3d.

This interesting report contains among other valuable material a statistical study of the question whether excessive infant mortality exerts a selective action by weeding out the unfit. Data from many localities are given which show that high infant mortality is associated with high mortality in subsequent years and also that the converse is true. There is then no indication that excessive infant mortality improves the resistence of the race, though Newsholme guardedly says that the study is not complete enough to demonstate that this may not be so. The diseases most prominent in infant mortality are discussed, and also the underlying causes. Of course the ignorance of mothers is one of the most important, but Newsholme considers that municipal uncleanliness also is very important and for this there is little excuse. The first duty of the municipality is to provide such an environment as will encourage not discourage domestic cleanliness. Various other means for reducing infant mortality are discussed such as visiting nurses, milk stations, better midwives and better registration of births. Other reports on this subject are promised and will be awaited with much interest.

The Conquest of Disease Through Animal Experimentation. By James Peter Warbasse, M. D. New York and London: D. Appleton & Co. 1910.

The agitations of antivivisectionists have begun to be almost continuous in some states of the country. Misleading literature they are sending broadcast among otherwise uninformed people: public exhibits of laboratory apparatus and procedures they are setting up in places where crowds congregate; and with morbid imagination the attendants, who have never seen inside of a biological laboratory, are explaining the "horrors" which they portray. Such efforts to create a sentiment in favor of the abolition of the most fruitful method of medical research is a direct menace to public health—a menace which is likely to be too little regarded.

As a means of correcting misconceptions which have been disseminated Dr. Warbasse has stated in terms easily understood some of the reasons for the application of the experimental method to living animals. The value of the method for teaching purposes, for the development of biological knowledge, and for the advancement of medicine and surgery is dealt with in a simple and straightforward manner. His discussion of the meaning of animal experimentation, the nature of pain, and what constitutes cruelty, is likely to be especially illuminating to the layman. And if the layman is ready to accept the dicta with which the book begins, that "life is the loftiest consummation of all natural energy," and that "human life should be the supreme object of human interest," then Dr. Warbasse's interesting account of the practical results that have come as great benefits to mankind from experiments on animals, will make a strong appeal for freedom of research. The results described include those that have enriched physiological knowledge, as well as those which have proved useful in the practice of medicine, in the preservation of public health, in the procedures of the surgeon, and in the saving of animals themselves from pain and death. The final chapter, devoted to a discussion of the antivivisection movement, and to the character of its adherents, is not likely to be relished by them, but it nevertheless is a fair statement of the perversity of their estimation of values.

Boston. WALTER B. CANNON.

Sewage Disposal. By Leonard P. Kinnicutt, Director Dept. of Chemistry, Worcester Polytechnic Institute; C.-E. A. Winslow, Asst. Professor of Biology and Biologist in Charge of the Sewage Experiment Station of the Mass. Institute of Technology; R. Winthrop Pratt, Chief Engineer of the Ohio State Board of Health. Published by John Wiley & Sons, New York City. Price, $3.00.

This octavo book of 421 pages consists of a well blended recital of American and European, especially English, experiences which have established the principal features now recognized in the science and art of sewage disposal. Almost without exception it is free of views that are either radical or so old fashioned as to be regarded as superseded.

The chemical and biological aspects of the book are more comprehensive and detailed than those of an engineering nature. Probably this is wise in a book of this size on a subject of such a wide scope as this one and which is undergoing such rapid changes in some of the more important aspects of engineering practice. Numerous references are given to details of results obtained from the findings of the Royal Commission on Sewage Disposal of Great Britain, as well as the results of tests and practical operations in America and abroad, especially in England. References are rather meager as to German investigations and experiences. To some extent the same is true of the results of current practice in the design and operation of disposal works in the United States other than in Massachusetts and Ohio.

The chapters on the composition of sewage, on sedimentation and on screening are good general reviews of reliable literature. Chemical precipitation, intermittent filtration, broad irrigation and sewage farming are tersely but comprehensively reviewed, giving the reader a good impression with regard to their respective efficiency, economy and availability.

Dilution is recognized as "a real method of purification," proper and economical under some circumstances. The details of the chapter scarcely do justice to American experiences with this method of avoiding nuisance. Particularly in one respect is it quite possible that the reader may be misled, on page 38, where in discussing a safe residual quantity of dissolved oxygen it is

stated, that "practically, any value below 50% of saturation is likely to be accompanied at times by malodorous conditions." On this basis the Merrimack River at Lawrence, serving as the source of the filtered water supply of that city, comes at times into the questionable class with respect to satisfactory disposal by dilution of the sewage from the cities above Lawrence.

The chapter on septic tank treatment is good and can be read with advantage by many engineers who do not distinguish clearly between septic conditions and the mere exhaustion of dissolved oxygen from sewage which turns dark colored in numerous long outfall sewers. The chapter is also of interest in indicating the manner which the village of Saratoga Springs has obviated any payments of royalty to the Cameron Septic Tank Co.

The development of the Emscher tank as a step in advance of the Hampton tank, and whereby sludge is septicized in separate compartments to a point of substantial freedom from odor, in accordance with the experience of scores of places in the Emscher District in Western Germany, is touched upon very briefly.

Coarse-grained filters both of the contact type and of the percolating (sprinkling) type are described in much detail. The outline of their nature and performances is good. There are very few statements to which exception could be properly taken. Perhaps the most conspicuous point is the expression of the opinion that automatic dosing or controlling devices are not advantageous for contact filters. Experience with several of the excellent devices now available in this country certainly shows them to be conducive both to efficiency and economy.

The chapter on sewage disinfection or sterilization is a well balanced resume of recent progress in this important branch of the subject.

Taking the book as a whole it may be safely said that it will be of much assistance in the class room in teaching this subject to students and especially to the public hygienist desiring to get a general insight into the subject in its broader phases, with ample opportunity to ascertain where the various results with different styles of plants have accomplished definitely recorded results.

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